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ABSTRACT

This newsletter examines education technology issues of concern to school faculty and administrators. Regular features in each issue include educational technology news, a book review, and a question and answer column. The cover articles during this volume year are: "The Build-or-Buy Decision: No One Right Answer"; "The National Information Infrastructure" (Bernard W. Gleason); "Information Literacy: Liberal Education for the Information Age" (Patricia Senn Breivik and Dan L. Jones); "The Role of the CIO in the Curriculum Change Process" (John Swearingen); "Seven Basic Principles of Dealing With Vendors"; "Hot Issues 1993-94"; "The Many Layers of Reengineering"; "How to Do A Help Desk Right"; "Do Computers Help Students Learn?" (G. Phillip Cartright); "The One Right Answer for Higher Education"; "Focus on the Foundation: Decision Support Will Happen"; and "Campuses Need Not Wait to Enter Cyberspace" (John V. Lombardi). (MAS)

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THE EDUTECH REPORT

April 1993

Volume 9
Number 1

The Education Technology Newsletter for Faculty and Administrators

ED 387 127

The Build-or-Buy Decision: No One Right Answer

Our university is so unique that we couldn't possibly find a software package to fit our needs. Our people want to do things a certain way, and they will not change just to suit a package. Basically our users like what they have now, even if they have to wait a long time to get things. Doing things in-house means creating something perfectly tailored to this environment. Besides, we can't afford a package; they're all too expensive.

We can't wait for in-house development; we need something quickly. We don't expect the users to be able to give us a full set of specifications for the system they want; no one could know that much about what they are going to need all along the way. The college could use some changes in the way things are done; a package might force us to look at doing things more efficiently. We don't want to continue to be so dependent on our technical people. Besides, we can't afford a large staff for in-house development; it's just too expensive.

Which point of view is right? Both and neither, unfortunately making the decision whether to build or buy an especially difficult one. To a very important extent, each college and university is unique; each one has its own particular style, personality, and approach which should be accommodated in anything as important as a software system. How can a generic package built for Everyschool possibly do this?

On the other hand, there is a basic set of functions that every school must employ; it must admit students, house them, register them for classes, give them grades, have them pay their bills, and raise money from them once they graduate, in addition to accounting for all of the financial and human resource activity involved in doing this. While there are many variations within these basic functions, software devel-

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"In the images we hold of American education, none is as prominent as the self-contained classroom. On the whole, ... the educational process is focused inward on the resources that exist within the classroom and the activities that occur there. The use of telecommunications technology in classrooms literally inverts the typical locus of educational activities. Classrooms face the world outside rather than the world inside. Instead of islands, classrooms have become links in communications highways transmitting data, video, and voice to thousands of other sites."

National Education Association
Final Report of the Special Committee on Telecommunications
Fall 1992

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NEWSBRIEFS

REPORT ON CAMPUS COMPUTING

Campus Computing '92, the final report from the 1992 EDUCOM•USC National Survey of Desktop Computing in Higher Education, is now available. This widely cited annual survey provides national data and follows trends affecting academic computing, including budgets, hardware preferences, operating systems and enhancements, campus networks, codes of conduct, student access to computers, technology as an instructional resource, and more. The report provides an aggregate national profile and also separate profiles for public and private research universities, public four-year colleges, private four-year colleges, and community colleges.

To order a copy of the full report, send a check for $30 (discounts available for quantity orders), payable to the USC/Center for Scholarly Technology, to EDUCOM-USC Survey of Desktop Computing, The James Irvine Foundation Center for Scholarly Technology, University of Southern California, 300 Doheny Memorial Library, Los Angeles, CA 90089; (213) 740-2327.

CAUSE CALLS FOR PROPOSALS

"Managing Information Technology as a Catalyst of Change" is the theme of this year's CAUSE conference, scheduled for December 7–10 in San Diego. CAUSE is calling for presentations for any of six tracks: leadership during times of change, leveraging people with technology, the impact of quality, managing in a client-server environment, optimizing the infrastructure, and information delivery to support the institutional mission. According to CAUSE, "track presenters can share strategies that have worked, as well as lessons learned from things that have not worked. Case studies, panel discussions from multiple user and management perspectives, management techniques and strategies will all be valued by CAUSE's audience."

Proposals are due by May 1. For more information, contact CAUSE at 4840 Pearl East Circle, Suite 302E, Boulder, CO 80301; (303) 449-4430.

CARNEGIE MELLON ADVANCES THE LEADING EDGE AGAIN

Carnegie Mellon University's School of Computer Science just recently purchased 100 Digital Equipment Corporation workstations featuring Digital's new Alpha AXP Computing System, introduced last November. Alpha AXP is a 64-bit, 200-megahertz architecture with four billion times the data addressing capacity of current 32-bit systems. It is based on a new, ultra-fast computer chip said to have about the same processing power as a Cray 1 supercomputer at a fraction of the cost.

The workstations will be spread across the university in areas such as the Psychology Department, Carnegie Mellon's Information Networking Institute, and among researchers in computational linguistics. The systems are also expected to give significant results to people doing bibliographic information search and retrieval.

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Let's Stop the Blame-The-User Syndrome

When end users have difficulty with a certain process or have trouble with a technology tool or cannot understand the way some documentation is worded, a tendency too many computer people have is to blame the user for the problem. This is usually not stated outright; nevertheless, it is abundantly clear what the message is: if there is a problem with the use of technology, it is either because the user is uninterested, unwilling to learn, unrealistic in his or her expectations, or all three.

Come on, we hear computer people saying, if the Financial Aid director doesn't want to sit down and learn the database structure, how can he expect to run his own reports? These users, today, boy, just expect to be able to push a button and have information magically appear on their screens.

Interestingly, this is not just an attitude found among the technical people; many knowledgeable users blame their less knowledgeable colleagues for not overcoming the same hurdles they themselves have managed to overcome and, furthermore, those less knowledgeable users even blame themselves. Guilt about not having fulfilled one's "responsibility" in the use of technology is rampant at some institutions, and one is likely to hear things like, "I tried to learn XYZ at one point last year, but I was so busy with other things, that I couldn't really take the time that was required to learn it properly. *So I have no one to blame but myself.*" Of course, the world is also full of people blaming themselves for not being able to program their VCR's.

It is impossible to overstate what a wrong-headed and ultimately destructive attitude this is. Technology is there to *serve users*, and if it isn't serving them well, it is the technology's (or the technologist's) fault, not the users' fault. Of course, the users have to make some investment in the technology, and nothing happens by magic, but it is also important to understand what is shaping the users' expectations today: easier and easier to use (but powerful) microcomputer-based software.

For example, if users have so much trouble learning to use something, let's say a mainframe database query tool, if the trouble is so great that they use it incorrectly or they don't use it enough or some of them have stopped using it or some never began using it at all, then the right conclusion to draw is that this query function is not an appropriate end-user tool, not that there is something wrong with the users. (In fact, most of the mainframe database query tools in existence today fit this description.) In the real world, some manufacturers are already beginning to realize that perhaps there is a flaw in the design of their VCR's, not in the people who can't figure out how to program them.

It is clear what the message is: if there is a problem with the technology, it is either because the user is uninterested, unwilling to learn, unrealistic in his or her expectations, or all three.

Another example: in the process of building an information system, the user changes his or her mind about one of the specifications. Arggh! How can we possible get this system done on time, say the computer people, if the users keep changing their minds about what they want? What the computer people are really saying is that they absolutely cannot allow the users to act like human beings, i.e., to learn more about what they need and then to translate those needs into new or different specifications; we want them to stick with the same set of specs for however long it takes to build this system, even if it takes months or years, and furthermore, they had better be thrilled with it when it's done. Don't bother us with new ideas; we have a job to do.

So, the users require an iterative process to participate in the development of a system; their understanding of the problem changes over time. But because the computer people are not using an iterative process—they get the specs once, build the system, then deliver it —the user gets blamed instead of the process when the system doesn't meet the user's needs.

To assume unchanging requirements is not only unrealistic, it just doesn't work. That's why more modern system development techniques include a built-in change order process, prototypes along the way, and interim deliverables.

This blame-the-user attitude needs to go away, fast. As technology cost-effectiveness becomes the established environment of the nineties, computer people are going to need to fully appreciate the need to form real partnerships with the users and to learn to see the world from the users' point of view. ■

The Build-or-Buy Decision: No One Right Answer ...

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opers long ago figured out how to support these functions using information technology. It is not always necessary or desirable to have to start from scratch every time a new function is needed, nor is it realistic to depend on the users to fully articulate the full functionality of every new system or system component.

Hidden factors

The process of making the decision is actually a pretty straightforward one; you need to compare the costs and benefits of the various options, and within your budget, pick the one that has the best cost/effectiveness ratio.

But the thing that makes it difficult, the main thing to keep in mind in making the build-or-buy decision for your campus, is that there are lots of hidden factors that need to be unearthed to make it a really good decision. The costs and benefits of the various options are not always obvious.

For instance, an anti-package sentiment around campus could very well be based on an evaluation of packages done several years ago. In fact, software packages today bear very little resemblance to their former manifestations, and it is important to not make this decision using yesterday's information. It would be as if someone were rejecting the use of WordPerfect 5.1 today because they saw an early version of Teco, a word processing package that was very difficult to use, full of bugs, and didn't do everything needed.

Administrative software packages available today tend to be highly functional, completely relational, virtually debugged, and, for the most part, table-driven to accommodate idiosyncratic campus requirements. All of these are desirable features of any system, and greater awareness of the current state of these products could go a long way in helping both technical staff and users understand that there might be a better way of doing things, even if the institution does ultimately decide to stick with in-house development.

Another hidden factor is the disruption the institution often goes through in installing a packaged software system. Generally, the implementation schedule can be more accommodating of individual user's needs and scheduling constraints when the system is developed in-house, leading, at least potentially, to less overall disruption of normal activities. A new system means major changes in the users' work environments, and with in-house development, the institution can take it slower, and have all the time it needs to incorporate and assimilate these major changes.

> *Each college and university is unique; each has its own style, personality, and approach, all of which need to be accommodated in a software system. How can a generic package built for Everyschool possibly do this?*

All of these kinds of things have to be uncovered and considered in order to do a really fair analysis of the situation, and of course, they also have to be evaluated against the institution's own particular criteria set.

Getting ready

You have decided that you need to move from centralized to distributed processing; from systems that were built to store and process data but which make it hard to access data to easy-to-use, friendly, open systems; from inflexible, labor-intensive software to software that is easy to change as needs change. All you need to decide now is whether to develop the new system in-house or to acquire a package from a commercial software vendor.

There are two things you need to do first in order to have the tools at your disposal to make a good decision. The first is to become educated about the outside world's technology and its various options. An effort should be undertaken to have as many people on campus as possible become aware of what is happening today in the world of technology.

You might want to consider, for instance, asking a software vendor to come in for a half a day or a day to demonstrate the system to a large group of people. You should be clear with the vendor that you are not making a commitment at this point; you are just trying to become knowledgeable about current offerings. If you are uncomfortable dealing with vendors at this level, you might want to go to one of the major higher education computing conferences (such as CAUSE, EDUCOM, CUMREC, etc.) where many vendors have their wares displayed in one area. This will give you and your campus colleagues a chance to ask the same questions of several vendors at once.

The second thing you'll want to do

is to conduct a needs analysis. Although this will take some time and effort, it is a step that really ought not to be skipped, as it will form the basis for objective decision-making down the road. The goal here is to create a document articulating the information technology support needs that the new system has to fulfill in order to be successful.

Once the needs analysis is done, two things should happen: the analysis should be given to the in-house computing staff for their time and cost estimates and a general appraisal of what it will take to accomplish, and it should also be turned into a Request For Proposal to outside vendors. That way, when you receive all of the responses, you will have an apples-to-apples comparison of the costs and benefits of each direction.

In addition to the specifics you will acquire during this process, there are some general advantages and disadvantages to each approach that should be kept in mind.

Advantages:
Purchased system

• A great deal of functionality is built in, without the users having to devise and articulate all of the functionality they might need in the future.

• It takes less time to achieve base-level functionality.

• There is generally less risk of not achieving success since so many of the unknowns associated with system development have been already addressed. A package that has been around several years, from a reputable vendor, is fairly well debugged by now.

• Membership in a "users' group," a common feature when acquiring a commercial system, can add substantial benefit to the system in being able to share information with other campuses.

Disadvantages:
Purchased system

• There is usually a higher up-front cost.

• The implementation tends to be highly disruptive for a period of time (usually 12 to 18 months, sometimes longer) and requires a substantial commitment on the part of end users to participate in the process.

On the other hand, there is a basic set of functions that every school must employ. While there are many variations within these functions, software developers long ago figured out how to support them using information technology.

• An as-is purchased system can be expected to meet only 70-80% of the institution's requirements.

Advantages:
In-house development

• The end result will be a system perfectly tailored to the institution's needs.

• The system can be implemented at the institution's own pace, over a period of time, and with an amount of disruption, that the institution feels comfortable it can handle.

Disadvantages:
In-house development

• The institution will have to attract the right amount and type of expertise in what could be new (for the institution) software development approaches.

• There could be an issue of staff readiness and training in new technology and new techniques.

• The programming staff will have to be larger than it would be with a purchased system.

• There is a certain amount of vulnerability in relying exclusively on in-house programming support.

• It's very hard to dedicate existing staff to new development and to have them break away from maintaining old systems.

The result

The trend today in higher education is a hybrid approach. Most institutions who undergo a careful analysis arrive at the conclusion that it makes sense to acquire a commercial package with the expectation that it will meet 70-80% of their needs. The remaining needs are filled either through in-house development or by acquiring these services from the software vendor. This approach makes a lot of sense, particularly if the in-house people are used to tailor the package and to build on its generic foundation.

If you factor in all of the costs and benefits, including the hidden ones, and if you spend some time developing your institution's particular criteria set against which to weigh the costs and benefits, you will arrive at a solution that's right for your institution. ■

The Emerging IT Organization

by Coleman Burton, University of Missouri

Part of the Association of College and University Telecommunications Administrators (ACUTA) Winter Seminar "Practical LANs and Internet" was a survey conducted among the attendees as to which LAN-oriented functions they believed were the province of the telecommunications group and which were the computing group's responsibility.

The results both surprised me and reinforced my own strong feelings on where telecommunications and computing responsibilities are headed. My belief is that colleges and universities that are committed to the effective and productive application of information technology will reorganize all of their units that deal with the creation, processing, and distribution of information into a single organizational entity.

Ultimately, I believe that such a group will go way beyond just the telecommunications and computing groups and include other information-related groups such as video, libraries, printing services, institutional research, and a number of other departments and groups as well. I am not aware of any college or university that has yet gone to this extreme, but I know of some that have made a good start in this direction, with generally positive results.

The results of our little, informal survey at the Winter Seminar substantiates the fact that many of our ACUTA members are increasingly becoming involved in areas that only a few years ago were considered strictly the domain and responsibility of the computer side of the house. It is becomingly rapidly apparent to many of us that the dividing line between computing and telecommunications responsibilities is blurring considerably, and will eventually just disappear completely.

> *If telecommunications and computing are consolidated into a single group, what happens to the "profit" that telecommunications makes from charging for their services? This is a situation that poses some interesting questions and problems.*

The survey asked, for eight different areas, "Who do you think should be responsible for these network components at your site?" The categories and percentages that indicated that the telecommunications area should be responsible were as follows:

Cables/connectors	95%
Wiring blocks/closets	95%
Hub/concentrator/MAU/CAU	70%
Bridge/router/gateway	61%
Internet connection	39%
NIC/adapter	35%
Network operating system software	9%
Application software	0%

In addition, a small, informal panel discussion was organized at the seminar to discuss how telecommunications and computing were organized at each of the panelists' schools. As you might expect, structures ranging from complete integration to complete segregation were represented.

Another interesting question dealing with integration came out during a question-and-answer session with the panel: If telecommunications and computing are consolidated into a single organization, what happens to the "profit" that the telecommunications group makes through charging for its services? This is a situation that I hadn't really paid much attention to before, but which certainly poses some interesting questions and problems.

Since the seminar I have heard from several ACUTA members who have had experiences related to their "profit-making" capabilities. In one case, the campus computing group was making what could be at best called a power play to take over telecommunications in order to get access to their revenue stream. In another case, a state university received a call from the state telecommunications group wanting to know if the university was using revenues from its telecommunications activities to purchase non-telecommunications goods or services—I still haven't figured that one out.

One of the potential problems is that in most telecommunications and computer organizations that I

Coley Burton is the President of ACUTA and the Director of University Telecommunications at the University of Missouri. This article is adapted from a piece he wrote in the March 1993 ACUTA Newsletter.

am familiar with, there is a decided difference in funding methodology. Computer groups, especially those providing academic computing support, are most often funded using the library model. Just like the library, the computer services group does not attempt to recover its costs or to generate revenue through charge-back schemes, and within its resource constraints, provides as much service as the users demand.

On the other hand, most telecommunications groups operate using the bookstore model. The services the user wants are paid for based upon usage. Often, the telecommunications function never even appears in the institution's general operating budget, but rather shows as an auxiliary enterprise or recharge center, recovering all of its costs through its charging for service.

As telecommunications, computing, and other information-based units are merged into a single information technology group (and this is bound to happen eventually), the question of the use of the revenue stream generated by groups like telecommunications will have to be addressed.

Just as there is with the organizational issue, there is probably an entire spectrum of answers to this revenue issue, and that what is correct and appropriate for one institution would be quite inappropriate for another institution. I know that a number of colleges and universities have gone or are now going through this process; I'm sure the rest of us would appreciate knowing how this issue is being resolved in various places. If those who have addressed this situation would take a few minutes to jot down what your institution has done and send it to the ACUTA office, we might be able to put it in a future newsletter. ■

To respond to this issue, to subscribe to the newsletter, or for more information about campus telecommunications, contact ACUTA at 250 West Main St., Suite 2420, Lexington Financial Center, Lexington, Kentucky 40507; (606) 252-2882.

The seminar schedule includes strategic planning for telecommunications and high performance wire and wireless/cellular technologies.

The 5th Wave

By Rich Tennant

"IT WAS BETWEEN THAT AND NEW CLASSROOM COMPUTERS."

In Future Issues

- *What's going on with national networking*
- *The value of technology in education is still being debated*
- *The role of the IT department in the reengineering process*

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EDUTECH RESPONDS

Q. In designing our new information system, we came up with the idea of having a "reporting database," that is, a subset of the main database, created probably once a week or so, and organized so that the users can get to the information easily. It would help performance also, if the users were not banging away at the "real" database. Does this approach make sense?

A. *This is the sort of solution that many campuses have devised in order to accommodate users' needs for data access in an older systems environment, perhaps where files are not integrated, awkwardly designed (for today's purposes), and hard to understand structurally. But in a newly designed environment, these sorts of problems should be taken care of by building on a relational architecture. Why would the users settle for week-old data in a brand new computing environment? Why would the users want to come back to you every time they think of a new data element they want to report on to be added to the "reporting database"? In fact, they probably wouldn't, and you should probably rethink your approach. If the structure is too complex for the users, simplify it.*

Q. Through tradition, our administrative computing group has always been responsible for everything that happens on the mainframe (in our case, really a minicomputer), and the academic group is responsible for the network and all desktop computing, including for administrators. But as computing usage on campus continues to grow, we are having more problems keeping these distinctions clear.

A. *Why would you want to? It sounds as if the result of this division of labor is an environment where an administrator 1) has to figure out which group to go to for initial service; 2) has to diagnose any difficulties he or she may be having so as to go to the right group for help (and as computing continues to evolve, it is going to be increasingly difficult for non-technical users to be able to distinguish a network problem from a mainframe problem from a microcomputer problem just by what they see happening on the screen in front of them); and 3) will always feel "second best" or forced to take a lower priority whenever he or she has to rely on the academic computer group for help. Overall, not a good long-term solution.*

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THE EDUTECH REPORT

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The Education Technology Newsletter for Faculty and Administrators

The National Information Infrastructure

by Bernard W. Gleason, Boston College

Since the inauguration of President Clinton, there has been a lot of talk in the press about the building of a National Information Infrastructure (NII), a major information network superhighway. An important issue facing higher education today is what we should be doing to influence policy relating to the NII. Although I certainly do not consider myself an expert on telecommunications, I thought it would be useful to discuss these issues from an administrator's point of view, and to synthesize many of the conversations in which I have taken part with my information technology colleagues recently.

My feeling is that our higher education chief executives should campaign for a national policy that would set six priorities. The first is to connect every university, college, library, primary school, and secondary school to a national network. Second, the network needs to be positioned as being complementary to the private sector, not in competition with it. The third priority is to place special emphasis on library access and access to federal, state, and local information and to continue the practice of providing institutions with free access to public information and public domain software. Fourth, we need to spur the private sector, not the government, to implement and maintain a national network. Fifth, we will want to provide information access to all market segments, such as education, home consumers, and manufacturing, and to recognize the requirements of each. And the sixth priority is to urge the government to break bottlenecks and remove barriers that may inhibit access by all market segments and by all individuals.

The National Information Infrastructure Concept

The National Information Infrastructure is often viewed incorrectly as a physical network, a bunch of interconnected fiber cables and copper

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"Campus-wide information systems not only suggest how vast is the universe of useful knowledge to be acquired, but how consequential it would be were we able to apply that learning within our lifetimes. As we are coming to see, we don't need to be as large as possible. We only need to be large enough to cast a shadow on the task before us."

Milo Nelson
"Now This/Editorial:
Large Craft Warnings"
Campus-Wide Information Systems
March/April 1993

NEWSBRIEFS

THE CHRONICLE OF HIGHER ED NOW ON-LINE

"Academe This week" is a new, free electronic service available on the Internet from *The Chronicle of Higher Education*. The feature includes a guide to the news in the current week's issue of *The Chronicle*; a calendar of the week's events in academe; a schedule of the week's events in Washington DC of interest to the men and women of academe; the week's important deadlines for fellowships, grant applications, exchange programs, and so on; and a listing if hundreds of job openings at colleges, universities, and other non-profit institutions worldwide (the job announcements come from *The Chronicle*'s "Bulletin Board" section—the world's largest academic-job marketplace).

A new edition is available on the Internet every Tuesday beginning at 12 noon, Eastern time; the service began on April 13, and during the first week, nearly 9,300 people used it. The service is on many "Gopher" servers under "All the Gopher Servers in the World." Users with their own Gopher software can find "Academe This Week" at chronicle.merit.edu, port 70. Anyone may request more information about access by sending an Internet e-mail message to help@chronicle.merit.edu.

DIRECTORY OF DISCIPLINE-BASED RESOURCES UNDER DEVELOPMENT

The Skidmore College Library is currently developing a discipline-specific directory of information technology activities and resources for EDUCOM's Educational Uses of Information Technology (EUIT) Program. A core set of major disciplines has been targeted and identification of the major associations for these disciplines or related professions is in progress. EDUCOM expects that this directory will be a major factor in helping faculty use information technology to improve undergraduate education.

For more information or to contribute information, contact Rosemary DelVecchio, the Humanities Librarian at Skidmore College, (518) 584-5000, rdelvec@skidmore.edu.

CONFERENCE AND WORKSHOP ON TECHNOLOGY-BASED EDUCATION

The National University Teleconference Network (NUTN) and Old Dominion University are sponsoring the eleventh annual conference for technology-based education: "New Directions, New Energies." To be held at the Virginia Beach Resort Hotel in Virginia on July 21–24, the conference is designed for those involved in distance education, educational technology, telecommunications, and continuing education. Sessions will include legal issues related to the electronic delivery of education, educational applications of the new communications technologies, marketing, administrative support structures for distance education, and more. There will also be hands-on workshops on video compression, videoconference production, and downlink coordination.

For more information, contact NUTN Central Office, 210 Public Information Building, Oklahoma State University, Stillwater, OK 74078; (405) 744-5191.

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IT At the Heart of Our Institutions

Book Review

As Julie Rudy, the Publications Director at CAUSE points out, the symmetry here is really wonderful. Bob Heterick broke ground with his authorship of the first CAUSE Professional Paper—*A Single System Image: An Information Systems Strategy*. This is ten years later, this is the tenth in the series of CAUSE Professional Papers, Digital sponsored both the first and the latest, and just to round it out, Bob, having served at one time as Chair of the CAUSE Board, is now the president of EDUCOM, CAUSE's counterpart organization.

But the best part of the symmetry is that this multiple-author Paper, just like Bob's first single-author one, is interesting, well-written, and insightful. It's also fun to read because, among other things, the authors of the various pieces are not at all hesitant to disagree with one another.

The subject matter, of course, is particularly relevant right now, with "reengineering" on the minds of a great many throughout higher education. But what do we really mean when we talk about reengineering—a word originally heard in the manufacturing environment? It is really a meaningful concept in higher education? What does it have to do with productivity? What is the role of information technology in reengineering, if any? Do certain kinds of institutions, such as community colleges, have more to gain from reengineering than say, liberal arts colleges? Are we approaching the whole subject too hesitantly, and thereby losing some real opportunities?

Reengineering Teaching and Learning in Higher Education: Sheltered Groves, Camelot, Windmills, and Malls

edited by
Robert C. Heterick, Jr.

This Professional Paper treats us to opinions on the full range of these issues, through five essays (including one by Bob Heterick) and four commentaries. And the opinions are as wide ranging as the institutions represented, including the "sheltered groves" of research universities, the "Camelots" of liberal arts colleges, the "windmills" of community colleges, and the "malls" of comprehensive institutions.

But throughout the Paper, there is a consistent theme: something has to be done and information technology can make a difference. What that something is, how extensive the changes need to be, and just how information technology will play a part is articulated according to each author's experience, understanding, and perspective.

It is so critically important for CAUSE to keep producing papers like this one, for any number of reasons. Probably most important is that, given the current climate in higher education, most information technology managers are so caught up in the day-to-day problems and responsibilities of their jobs that it is very difficult to find the time to devote to conceptual matters. What are we really doing here? Is it worth it? Are we making a difference? Does anyone care? A paper like this one, even with its differing opinions, still reinforces the fundamental importance of technology to the educational endeavor, and can serve as encouragement for those becoming increasingly downhearted about their work.

The other important purpose for this kind of paper is to be a conversational link between information technology managers and the people they work for, both directly and indirectly. The issues raised in this paper are not technology issues *per se*; they are not about baud rates and MIPs and fiber optic cabling. They are broad issues that everyone in higher education needs to be thinking about. This paper presents a real opportunity to the campus technology manager to become sufficiently well-informed to be a genuine and important participant in the institutional conversations that are going to inevitably take place. Instead of just reacting to the institution's needs, the IT manager needs to anticipate, and even help shape them; this Paper will help.

Whether you are in a sheltered grove, a Camelot, a windmill, or a mall, you will find enormous value in this Paper. As Bob says in the Preface, "Although change is inevitable, it is always accompanied by uncertainty." Educating ourselves with this kind of material is a way to lessen the uncertainty.

This paper is available for $12 for CAUSE members and $24 for nonmembers. CAUSE is at 4840 Pearl East Circle, Suite 302E, Boulder, Colorado 80301; (303) 449-4430. ■

The National Information Infrastructure ...

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wires, rather than a logical network. Politicians, in particular, tend to focus too much on the physical characteristics of networking such as coaxial cable, twisted pair telephone wire, or fiber optic cable; they try to compare the information network to the highway system. In a logical design, the physical underpinnings of the network can and will change, and packets of information will be switched over a variety of physical mediums.

The physical characteristics are not as important as the throughput speed. While a network totally based on fiber optic cable will guarantee that the cable plant will be adequate to support the high-speed transmission of multimedia, the budgetary considerations restrict the feasibility of wiring fiber cable to every desktop. In addition, it is likely that future advances in data compression schemes and switching technologies will extend the capabilities of the copper-based wiring of conventional telephone wires. This extension will minimize the need to install fiber and will allow us to take advantage of our investment in telephone wire.

The success of the Internet —— Up to this point, higher education has provided leadership in the promotion of data networking between colleges and universities, government agencies, libraries, and researchers through the Internet. The Internet, which got its start at the Department of Defense over a decade ago, allows individuals at educational institutions and government agencies to inter-connect campus networks. This integration of networks permits users to interactively communicate with each other via electronic mail, to directly access other computers that may be at remote locations, and to transfer files between these computers. Other than the initial connection costs and the moderate annual fees that institutions pay to connect their networks and attach computers to the Internet, there are no charges for legitimate computer users to use the Internet.

Commercial networks, such as Compuserve, America On-Line and MCI, charge monthly connection and usage fees. The charging schemes of commercial network vendors are similar to the connection and usage charge methods that are assessed for telephone service. These commercial networks are linked to the Internet through bridges or gateways, allowing Internet users at educational institutions and government agencies to communicate with individuals who are using commercial services. The fact that users are operating different networks that are bridged, or inter-networked, is transparent—it appears to be a single network.

> *One of the controversial aspects of the NREN has been the accent on the "R" (Research) at the expense of "E" (Education).*

Most activist computer users on college campuses make daily use of the Internet and the convenience and effectiveness of the Internet is rapidly gaining acceptance and broader usage. The success of the Internet and the inter-connection with commercial networks has been a key factor in the promotion of the broader concept of the National Information Infrastructure. In fact, President Clinton's election team used the Internet as a means of communicating during the presidential campaign.

How the NREN fits in —— One of the leading spokespersons in Washington for the national network has been Vice President Albert Gore, who has envisioned himself as the principal sponsor of the national information network, just as his father a generation ago was the major proponent of the national highway system. In 1991 the High Performance Computing (HPC) Act, sponsored by then-Senator Albert Gore, was passed by Congress and signed by President Bush. The bill provided $800 million to fund the National Research and Education Network (NREN). The expected outcome of the HPC Act was to provide broadband, high-speed networks for connecting all educators, researchers, librarians, government, and industry in every state.

The NREN is really an extension of the existing Internet. The major emphasis of the HPC Act was to increase the speed of the network and to increase access by more campuses and individuals. While the transmission speed is being altered (increased), the physical structure of the Internet is not. The NREN, which is a higher speed extension of the Internet, is a portion of the National Information Infrastructure. As educational institutions, we should all be interested in the continued support of the NREN portion of the NII.

Bernard Gleason is the Executive Director of Information Technology at Boston College. Among other achievements, Bernie is the winner of the 1992 CAUSE ELITE Award.

Concerns about the NREN ___ Administration for the HPC Act was assigned to the NSF, which has traditionally been involved in the awarding and administration of research grants. Consequently, one of the controversial aspects of the NREN has been the accent on the "R" (Research) at the expense of "E" (Education). While research is important, the research emphasis may draw funding away from the goal of universal connectivity of educational institutions to the network.

Beyond the emphasis on research, there are other influences that may hamper the development of the NREN. For instance, we are already seeing pressure from special interest groups to embrace other market segments, such as manufacturing, farm agents, health care providers, and federal information without first addressing the goal of universal connectivity.

The current political climate—raise taxes and cut government spending—may have an adverse effect on the promotion of the NREN. In this environment it is probably going to be difficult to sell spending on the network infrastructure to a Congress made up of people accountable back in their home districts and who are looking for programs that will have a direct and recognizable impact. Networks, unlike highways, bridges, and buildings, do not have that kind of visibility, even though they may be more important.

If the pressure from large research institutions and special interest groups is successful, then we are in danger of expanding the distinction between institutions rather than promoting greater cooperation between all elements of education, from kindergarten on up. According to Mike Roberts at EDUCOM, of the 3,000 colleges and universities in this country, only about 1,000 (mostly the larger and research institutions) are currently connected to the Internet. We are already creating a new class of "haves" and "have nots." Most of the smaller colleges are not connected to the Internet, nor are most of the schools and libraries in surrounding municipalities.

Support for the NII _____ Business leaders are supporting the NII for a number of reasons, including altruism. Without the NII, the business markets will be at competitive disadvantage with the Japanese. The home market provides the greatest opportunity for expanded services and income. In the near future it is anticipated that a reasonably priced device capable of supporting voice, data, and video will be available but will require the necessary network speed and bandwidth to be effective.

Most of the smaller colleges are not connected to the Internet, nor are most of the schools and libraries in surrounding municipalities.

The desktop device of the not-too-distant future will combine the computing and communications power of today's high-performance workstation at the affordable price of today's microcomputer. The device will provide CD quality sounds, will be a digital telephone, and will support high resolution video; all this functionality will be integrated.

A lot of focus has been placed on the home marketplace but, again, according to Mike Roberts, there are probably only 20-30 million homes out of 100 million who have the disposable income to pay for the connection and home computing device. There are another 20 million disadvantaged families who will probably never participate. A major issue is whether we can justify government spending to support the home market to benefit the 20-30% making up the "privileged class."

Who should be building and maintaining the network? Why can't the existing telephone system, which has wiring to just about every home and office, serve as the national network? My feeling is that it is in the best interest of everyone to have the NII built and maintained by the private sector, taking advantage of existing facilities wherever possible.

The local and long distance telephone companies are lobbying the White House to let private companies implement and manage the national network. The telcos are recommending that the government should help finance experimental research networks, such as the NREN, to connect universities to supercomputers. The telcos want use restricted to research, and closed to commercial services.

Where does this leave education? I'm sure that the telcos view students in dormitories the same as the home market—an area for selling services. This raises some interesting questions, such as what will a basic service like electronic mail be considered if it is in direct competition with telephone service?

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Let's Stop Blaming Anyone

by Les Lloyd

In the April *Edutech Report*, an anonymously written article entitled "Let's Stop the Blame-The-User Syndrome" appeared. My guess is that the author probably can't program a VCR, run a database sort, or assemble a bicycle from instructions provided by the manufacturer. The author's contention is that everyone else is messed up, so blame them! The author has quite obviously oversimplified the situation.

As a "technologist," I find it funny that less than one sentence of this article was devoted to the responsibility of people who use computers to know how to use them. It is quite true that computers and their software are getting faster and easier to use. But until the computer you work on is upgraded, you still have to know how to use it.

Take, for example, the author's comment about the Financial Aid person who doesn't know his database structure and therefore can't write reports. It is true that systems are available with good report writers. But it is very expensive to convert systems. If a system works, there is a shared responsibility to do the best with it for the good of the institution. If a new computer or software package is not on the horizon, then the Financial Aid person must know the database. If not, he or she will be tied to doing things the way they have always been done, or relying on one knowledgeable person in the department, whose departure will likely leave that person up the creek.

I agree that joking about the people "upstairs" who can't figure out how to do things is inappropriate. But when people don't attend classes for their benefit, don't learn from doing and from others in their department, it can be funny to answer the same question for the third or fourth time.

It makes technologists wonder how managers keep these people on! If these people didn't answer their phones, or didn't fill out forms correctly, or didn't do other aspects of their jobs, they would be fired. Why then are they permitted to stop using the system when it becomes inconvenient? If computer use is in someone's job description, then he or she, given the appropriate amount of training and support, should be expected to use the system that is available.

The real issue here, though, is management. When the Financial Aid director doesn't know the database, it is likely that others in the department don't know much about the system either. It is further likely that this person would not stress computer training as important since "things are working fine."

But what management does not realize is that computer systems do change; if managers do not know the system, they are at the mercy of their staffs and the computing people. If a manager hasn't a clue as to how things work, then when the computer person says "it can't be done," that manager must take the technologist's word for it.

It's possible that some databases are too difficult for anyone to learn. But most are not and are learned by people who are interested or rewarded for doing so. From my experience teaching both students and staff, I find that it isn't the syntax at all that bothers people, it is basic logic. Many people do not understand Boolean searches or the ordering of variables, when to use "and" and when to use "or." These are fairly basic concepts, and I would argue that people ought to be familiar with this type of logic and process.

Finally, iterative processes in software development are positive ones. But when a manager designs a system, or requests a change, and then when the project is complete wants to add something new, all must understand that it isn't always easy; time may have been already allocated elsewhere by the computing staff. This isn't always an issue of the user becoming more computer-savvy; it is often an issue of a manager who doesn't plan ahead. Chances are he or she has done the same thing with non-computer projects too.

The bottom line here, and one of the tenets of Total Quality Management (TQM), is that assessing blame is fruitless; there is nothing to be gained. But until management understands that knowing their computer systems is as important as knowing how to manage people, or knowing how to deal with budgets, or knowing how to do the rest of their job, this pointing of fingers will continue.

Computers are here to stay, as are VCRs. One can try to ignore them or say they are too hard to learn, or one can bite the bullet and invest some time in learning them in order to be more productive. It all depends on your priorities. ■

Les Lloyd is the director of computing services at Lafayette College in Pennsylvania. He is a frequent contributor to The EDUTECH REPORT as well as to several other publications.

The National Information Infrastructure ...

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The local Bell operating companies are just completing the conversion of their central offices switches from analog to digital. They have made a major investment in technology that is not sufficient to support required multimedia devices and transmissions; while the Public Branch Exchanges (PBXs) at most central offices are capable of handling data over voice lines, the current capacity is limited. In a few years PBXs will be obsolete. Many campuses are using routers and bridges to switch data; we expect the NII to use similar technology and techniques. In the process of moving toward the NII, the telcos recognizes the need to adapt but they also see this as a way to get out from under regulatory limitations. They are concerned about the adoption of models which have failed in Europe.

The cable TV industry will be a player here as well; it is currently better positioned to support the home market. In some areas of the country, cable companies are already running fiber optic cable to every telephone pole. All cable companies already run coaxial cable to homes, capable of supporting greater bandwidth and speed than telephone wires, and cable customers are already accustomed to a programming box on their TV sets.

Even now, we are witnessing the loosening of federal regulations that will now allow the telephone and cable TV companies to compete directly, such as voice services delivered by cable TV companies, video services supplied by telephone companies, and data and information services supplied by both. Cable TV and telephone companies both see the future of an industry that merges the worlds of TV, telephones, and computers.

The problem here, however, and perhaps the most important issue in all of this, is that too much business influence will lead to a situation where the primary activity on the network will be entertainment. It is, after all, entertainment which sells, and which, therefore, contributes to business profitability. Unfortunately, this could be at the expense of the information sharing activity which should be of primary importance to higher education.

Conclusion

EDUCOM is serving right now as higher education's voice in Washington. They are playing a critically important role here, but it is time we started adding the voices of our college presidents and leaders to the discussion. There are no really clear answers here yet as to just what will happen in the future. What is clear is that we are headed for a highly interconnected future, and that the basic infrastructure will come about as a result of strategic partnerships between education, government, and business. ■

"'Client-server' is one of the buzziest of the buzzwords. It refers to a computing system that splits much of the workload between PC's and one or more larger computers on a network. Think of it as a restaurant where the waiter takes your order for a hamburger, goes to the kitchen and comes back with some raw meat and a bun. You get to cook the burger at your table and add your favorite condiments. It sounds like more work, but it has many advantages: the service is much faster, the food is cooked exactly to your liking, and the giant, expensive stove in the kitchen can be replaced by lots of cheap little grills."

Peter H. Lewis
"The Lingo, from 'Client' to 'Kludge'"
The New York Times
May 2, 1993

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EDUTECH RESPONDS

Q. It seems that no matter what we do in our academic computing activities, or what kind of services we deliver, we continue to have a negative reputation with the faculty. Either they can't tell us what they really need from us, or their expectations are out of line with budgetary reality. How do we solve this problem?

A. *Often, the real problem is that the faculty do not see proactive behavior on the part of the academic computer services staff, indicating to them that the department is not reaching out enough in the delivery of its services. The faculty may see the whole set of academic computing activities as somewhat reactionary and isolated. It is very important to develop a perception in the faculty throughout the institution—even among non-users—that the academic computer people are reaching out to them, especially in the area of academic software (this doesn't mean developing software, necessarily), and are ready to assist them in their pursuit of educational goals. Reshaping yourselves to be seen as partners with the faculty is probably the highest level of service that can be provided, and will help change the faculty's attitude.*

Q. We need a new computer to support administrative computing, but we don't want to change the software just yet. What kinds of things do we have to keep in mind in choosing new hardware?

A. *Since you want to keep your software, you will, of course, have to look at the conversion issue, and decide how much you can afford to spend on it; your budget here may limit your choices of hardware and operating system. Aside from that, the most important characteristic of any major decision being made today in the area of information technology is its potential for connectivity. Even if you do not at this time have a formal long-range plan for networking the campus, your choice of computer should allow any sort of sensible plan to be built around it. You should not have to worry that this computer will close off any important networking options. Generally, that means that you will need to consider what is happening not just on the administrative side, but on the academic side as well. Overall, it is realistic to look for hardware that improves the current situation in 1) reliability; 2) performance; 3) capacity and 4) expense, especially if your current computer is very old.*

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Information Literacy

Liberal Education for the Information Age

by Patricia Senn Breivik and Dan L. Jones

During recent decades, knowledge and its many sources have grown exponentially, transforming our concepts of what is worth knowing. The task of handling the super-abundance of information available through new technologies seems at best overwhelming, at worst totally unmanageable and uncontainable. Those of us in higher education—especially us—must not only realize that we are dealing with a vastly changed world, which is and will continue to be alien at times, but also begin to assess honestly what we need to do to prepare our students to function effectively in this sometimes scary Information Age.

Before the onslaught of the Information Age, there were many changes throughout the history of education—most driven by the expanding and more diverse student body we are called upon to serve. Higher education and the liberal education philosophy, by and large, have well served generations of returning GI's, influxes of women and minorities, and even those for whom English is a second language. The information explosion, however, is one change that has the potential to shake the very foundation of traditional teaching and learning practices and significantly alter our notion of what constitutes the core of a purposeful liberal education.

Stop to reflect for a moment on these recent developments: the educational possibilities of high-speed computing; instant access to electronic data bases of sizes and scopes undreamed of ten years ago; the seemingly unlimited potential of electronic publishing; easy access to and communication with international networks of scholars, access that used to be formidably difficult to achieve; the portability of laptop computers and CD-ROM data bases; and the integration of computer and video technologies.

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"As we affirm the future of the printed book, we recognize that electronic media are enabling the creation of original and derivative records of human thought which may have no future, no permanence. It seems likely, therefore, that the future publishing and reading of books will be compatibly linked with the increasing production of information in nonprint formats."

Peter V. Deekle
Susquehanna University
"Beyond Books and Bytes"
Liberal Education
Winter 1993

NEWSBRIEFS

KEN KING BECOMES NEW DIRECTOR OF CREN

The Corporation for Research and Educational Networking (CREN) has announced the appointment of Kenneth King, former president of EDUCOM, as its new Executive Director. CREN is the parent company of BITNET, a network that connects more than 550 higher education institutions nationally and, through BITNET Cooperating Networks, another 700 internationally. CREN is also actively developing Internet services to support its members' networking activities.

Dr. King has over forty years of experience in higher education and information technology. In addition to serving as president of EDUCOM, he has been Vice Provost for Computing at Cornell University, Vice Chancellor for University Systems at the City University of New York, and Director of Computing at Columbia University. His activities in the networking arena have included being one of the founders of the EDUCOM Networking and Telecommunications Task Force, NYSERNET, and the Internet Society, and serving as a member of the original BITNET Board of Trustees. Dr. King is also a member of the Federal Networking Council Advisory Committee.

NEW BOOK AVAILABLE ON ADMINISTRATIVE COMPUTING

Administrative Computing in Higher Education: Issues in Enterprise-Wide Networks and Systems will be published shortly by the Meckler company. Defined for this book as "the use of networked computer systems by administrative personnel who share internal data as a function of their managerial duties," administrative computing is discussed in depth, including models of data sharing across systems, upgrading administrative software, selection and expansion of computing systems, expanding the base of users to other campus clientele, and other distributed computing topics.

The book is edited by Les Lloyd of Lafayette College, and includes a series of case studies and papers contributed by a wide variety of educators and campus administrators. It will be available in August for $40 from Meckler, 11 Ferry Lane West, Westport, CT 06880; (203) 226-6967.

ARL EXPANDS DIRECTORY OF ELECTRONIC PUBLICATIONS

The Association of Research Libraries (ARL) is publishing the third edition of the *Directory of Electronic Journals, Newsletters, and Scholarly Discussion Lists*. The new edition is a compilation of entries for 1152 scholarly lists and 240 electronic journals, newsletters, and related titles—an increase of close to 60% over the March 1992 second edition. The directory provides specific access information for each publication.

The directory is available for $42 plus shipping and handling from Gloria Haws, Publications Manager, ARL, 21 Dupont Circle, Suite 800, Washington, DC 20036; (202) 296-2296. Special pricing is available for multiple copies and/or members of the ARL.

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MEMORANDUM

To: Jim Smith

From: President Stevens

Subject: Our Internet Connection

Jim, it has come to my attention that our impending connection to the Internet has some potential problems associated with it. I have learned that pornography, racist and sexist statements, exploitive humor, and other forms of objectionable material are sent over the network, and that our students may be exposed to this material. Furthermore, I have learned that much of the material on the Internet is not edited by anyone, nor are there effective ways to prevent being the recipient of unwanted material.

This is clearly unacceptable, and quite frankly, I'm surprised that as our Chief Information Officer, you did not bring this to my attention when you first brought up the idea of having our campus acquire its own Internet connection. My understanding is that this connection will likely carry a not-insignificant cost after the NSF grant runs out, and it seems to me that it would be difficult to justify this expenditure in light of what I have learned about Internet transmissions. How could I possibly explain this to the parents of our students?

I am very well aware of the benefits of the Internet, and I know our faculty are as well. Certainly the access to so much scholarly material and communication makes a compelling case for this medium. But I also know that I express the thoughts and feelings of many on this campus when I say that the material shared and communicated on the Internet should be of an appropriate nature, and if it is not, then our campus must not become a participant.

I'd like you to take a week or so to think about this, and then present me with either a plan as to how, if we are to have an Internet connection, to prevent objectionable materials from reaching our students; or the assurance that you will not proceed further with plans to connect this campus to the Internet. I see no middle ground on this, do you?

Let me hear from you soon.

BEST COPY AVAILABLE

Information Literacy ...

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Despite these promising advancements—and many others—higher education for the most part has only dabbled in the applications of information technologies. Indeed, a great irony today is that higher education had the advantage of extraordinarily sophisticated information technologies, yet too often it does not consciously choose to use them to enhance students' learning. Most American colleges and universities have never purposefully used these technologies to create an enriched learning environment—one that will equip and prepare students in 1992 for the twenty-first century.

If anything, in recent years we have lost ground in our effort to provide a liberal education that develops the skills necessary for lifelong learning. In *College: The Undergraduate Experience in America*, Ernest Boyer cites some alarming statistics: "About one out of every four undergraduates spends no time in the library during a normal week, and 65 percent use the library four hours or less each week."

In fact, there is growing recognition that society has reached the point at which traditional literacies sought by a liberal education—in writing, speaking, and mathematical reasoning—are insufficient. In 1989, for example, a report issued by a group of national leaders in education and librarianship, the *ALA Presidential Committee On Information Literacy Final Report*, called for a learning process that would "actively involve students in the process of knowing when they have a need for information, identifying information needed to address a given problem or issue, finding needed information, evaluating the information, organizing the information, [and] using the needed information effectively to address the problem or issue at hand." Higher education is being called upon to define and develop a new learning style that fosters within students the abilities needed to be information-literate.

Most American colleges and universities have never purposefully used these technologies to create an enriched learning environment—one that will equip and prepare students in 1992 for the twenty-first century.

We now believe that the teaching necessary to achieve such a liberal education must include models for exploring the uses and potential abuses of all information resources and technologies. We need to coach students through those explorations as they move through changing mazes of information, and they must become sophisticated users of these resources and technologies as they: gather needed information from all sources; test the validity of information as it remains constant and as it changes from discipline to discipline; place information into various contexts that ultimately will yield its pertinent meaning; and remain skeptical about information and discriminate fact from truth. Such a learning process will result in information-literate students who have, in fact, learned how to learn.

As necessary as this new literacy is, there are significant barriers to incorporating it into current educational programs. Chief among these is that most educators received their degrees prior to the technology explosion; they have had little or no training in the use of new information technologies nor any experience, as learners, in classes where the use of information technologies was integrated into the curriculum. Moreover, these technologies are a moving target; that continuous change keeps interfering with the comfortable status quo.

In addition, both the publish-or-perish reward system and the overabundance of information strongly encourage a very specialized approach to research and teaching on the part of faculty members. This, however, is counter to the best interests of students who will be called upon to work in a world whose problems do not fit into discretely defined discipline parameters.

Indeed, on most campuses, there are no general requirements that ensure a threshold level of information-management skills. Moreover, when major problems do have a specific course requirement that emphasizes and establishes research methodologies for their students, they often do so by heightening and valuing the difference and superiority of their methodology to those used in other fields. Students, in turn, become

Patricia Senn Breivik is associate vice president for information resources and Dan Jones is professor and chair of the English department at Towson State University. *This article is copyright 1993, Association of American Colleges; reprinted with permission from Liberal Education, Volume 79, Number 1 (Winter 1993).*

baffled when a professor in one course unwittingly shows that his or her idea of valid information—how to gather it, evaluate it, and apply it—is markedly different from the perspective they encountered fifty minutes earlier in a course in a different discipline. Such realities further support the need to develop standards for information literacy within liberal education.

Among the groups seriously addressing this concern, as well as Boyer's challenge to graduate "self-directed, independent learners," is the Middle States Association of Colleges and Universities' Commission on Higher Education. Middle States' executive director, Howard Simmons, explains his agency's commitment to information literacy in *Information Literacy: Developing Students as Independent Learners*: "The [Middle States] Association, as part of its planning process, concluded that one of its initiatives for assisting member institutions in improving undergraduate education should be a stronger emphasis on assessing student and faculty utilization of library and other learning resources.... As educators, most of us today have become increasingly aware that we and our students need to acquire more sophisticated information skills to access and use information in a variety of formats to address our education and life objectives."

Simmons goes on to explain the need for faculty members and librarians to work collaboratively in developing information literacy and resource-based learning programs. As a natural consequence to such an emphasis, accreditation criteria switch from the number of library instructional offerings to "program requirements, as reflected in course syllabi, student learning contracts, and in the nature and extent of student and faculty use of library materials...."

Clearly such an approach goes far beyond traditional library instruction—which usually is an add-on that has little bearing on the grade students will receive—an emphasis on information literacy requires students to use a variety of information resources (such as newspapers, television, on-line data bases, government publications, experts) as an integral part of their class assignments. It gives students the message that faculty members believe that being able to locate, evaluate, and effectively use information is critical to learning. The faculty member in effect becomes a collaborator in learning, helping students find efficient ways to gather information and to make discerning judgements about what is and is not useful among the overabundance of available data.

The faculty member becomes a collaborator in learning, helping students find efficient ways to gather information and to make judgements about what is and isn't useful in the overabundance of data.

Where does "the book" fit into all of this? The book, at its best, has always represented the most complicated and sophisticated model of human discourse. In making a book, writers have directly and indirectly entered a dialogue with both the past and the present—gathering, validating, sorting, recording, and changing the meanings of both what is new and what is old in order to project a different present or future, or to provide unity for what formerly were merely scattered or disassociated facts. As such, the book has served as a primary model for finding the context that gives random information its pertinence, meaning, and potential.

Nonetheless, in today's information society there are strong and worthy alternatives to books as providers of information and even—at their best—knowledge. We are called upon to help students appreciate the place of the printed word among competing sources of information. In older, simpler times, books were the main source for all information; since this no longer is the case, students must become able to learn from all the other newer and often more chaotic sources of information as easily as they learn from books. Video and films are, in fact, better than books for experiencing the performance values in a play by Shakespeare. Compact disks are better for learning about different treatments of a musical arrangement, and sometimes a book or a journal article is inferior to rapidly retrievable computer-based information—especially if the most recent information is critical to making a choice, solving a problem, or taking action.

Of particular concern is that students may place undue reliance on a specific information resource. Research has shown, for example, that many people feel that information gained through a computer screen is more reliable than that from any other source. At times it

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Peer-To-Peer System References: A Critical Information Source

One of the most critical steps in the process of choosing a new administrative information system is to conduct peer-to-peer references as a source of information about how the various system choices are actually being used in real-life situations.

All too often, however, this good opportunity to gather serious and objective information is hampered by "the schmooz factor"—that is, the friendly banter that takes place among colleagues. Not that the information gathered through schmoozing isn't valuable—it is; it just usually is not complete. It is generally very subjective as well, and can serve to bias you unnecessarily.

In order for peer-to-peer system reference checking to fulfill its potential as a valuable and objective source of information, it should have three characteristics. First, the references should actually be among peers. That is, the insights gained are going to be much more valuable if done directly, and not through the computer center folks. This means it will require an investment of time on the part of the users, but it will prove to be well worth it in making a good systems choice.

Second, for obvious reasons, the peer reference checking should go beyond the list of institutions supplied by the vendors. There are others sources of data about which institutions are using which systems (such as CAUSE, for example) and these can supplement the vendors' lists. Nor should you be intimidated by vendor admonishments to not contact anyone on the supplied list without the vendor's permission. This is nonsense and any vendor that actually expects you to wait for permission does not deserve further consideration.

Third, the same questions should be asked of each reference, regardless of who at the institution is doing the asking. The following list of questions is an example of a way to provide structure to the peer-to-peer reference process, and another opportunity to develop "apples-to-apples" information.

What software do you have? This isn't as silly as it sounds; it is a way of ascertaining that the information you are going to hear actually pertains to the version you are contemplating acquiring. The differences between versions of the same software package can be so large that the information about a different version may not be very valuable in helping you to evaluate the choices before you. Since most software packages today are modular, it is also important to know which of the modules are actually installed at this reference site, and how long they have been running.

What hardware are you using? Software systems running on different hardware may run differently and may even have different features. You'll want to know how close your own environment is to the one you are getting information from.

Did you participate in the decision to choose this software? This can be a critical question because for some folks, no matter how good the system is, if they didn't help to choose it, they don't like it. On the other hand, if they did help choose it, they are likely to be much more well informed about its capabilities and features.

Is the software vendor currently maintaining the software? Has the institution kept the software under a maintenance agreement with the vendor so that bug fixes, modifications, and enhancements are being done more or less regularly? If not, why not? Was it something about the vendor that contributed to the decision?

Do you go to users group meetings? If so, do you think they are worthwhile? This link with the users is a critical information source for the vendors and if they don't have a users group, you might wonder why not.

Did you have to change your procedures, policies, work habits, or anything else significantly to accommodate the software? If yes, was the change for the worse or for the better? The answer to this question can provide a lot of insight on the overall impact the system has had at this institution, and will likely have at yours.

Is or was there anything about the system either outstandingly good or outstandingly bad? You will want to include in this question the software installation process; the training that was done and whether it was done by the vendor or by in-house staff; the documentation, both user and technical, and of course, the software itself.

If you had to make a choice today, would you choose this vendor and this software package? This is the Big One. Although it is likely to weed out only those horribly bad packages or vendors, it should be asked, and the answer factored into your decision. ■

Information Literacy ...

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is; more often, it is no more—though perhaps no less—reliable than other sources. Higher education may be faulted to the degree it fails to teach individuals how to evaluate the validity, timeliness, completeness, and relevance of information regardless of its format.

In addition, students must become discerning in how they package reports and other outcomes of their own learning experiences across the curriculum; they need to develop a critical appreciation for each format and to distinguish in which setting each format is most useful. They even need to know when to transform or repackage portions of information to better illuminate their understandings (for example, changing numbers into pictures—graphs—that provide greater insight than lists of statistics could provide).

When a liberal education embraces these concepts, when it is defined by and supports the goal of graduating information-literate students, it will have renewed power in the Information Age. It will be the "center that holds" as information threatens to spin out of control. In fact, the point of balance where the center holds must be information literacy because those who lack the skills to use today's information resources and technologies will quickly become a new underclass.

Not only is this true for individuals, but some leaders believe it is equally true for higher education as a whole. For example, in his speech to faculty members on a California campus in August 1992, James B. Appleberry, Executive Director of the American Association of State Colleges and Universities, issued the following warning: "If we are to remain the intellectual leader of the world, we must rethink the structure of information in each of our disciplines. We must understand that information in most of our disciplines is not linear, and that the teaching we do must prepare a student who will randomly access information across a broad array of disciplines."

The challenge for all of us involved in higher education today, therefore, is to develop better ways to serve as learned guides through old and new resources as students undertake their search for knowledge in a world and an economy we recognize and accept as drastically different from what existed just decades ago. Only through such well-planned leadership is it likely that college graduates will ever develop the full range of abilities that will be absolutely necessary for future professional flexibility and successful citizenship. ■

The entire issue of Liberal Education focuses on "The Future of the Book," and is available for $10 plus $4 for s/h from the AAC, 1818 R Street, NW Washington, DC 20009.

"We are witnessing the birth of new learning communities, which are defined by telecommunications links and not by the space in which they exist. They permit a level of geographic and cultural diversity in education that could only have been imagined previously.... Teachers have moved from center stage to concentrate more and more on overall coordination, planning, the organization of learning opportunities, and the mentoring of individuals and small groups of students. At the same time, students have considerably more freedom to define their activities, choose the direction of their research, and collaborate with their peers."

Educational Telecommunications
National Education Association
Special Committee on Telecommunications
1992

In Future Issues

- *Creating the link between legacy systems and end-user information*
- *Is downsizing inevitable? Is it worth trying now?*
- *The changing role of the higher education Chief Information Officer*

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EDUTECH RESPONDS

Q. Despite having an excellent computer center, several departments around campus have set up their own computing "labs." These areas are equipped with computers of the departments' own choosing (almost always this means computers that are not the campus standard) and staffed by students hired by the departments. We'd like to put a stop to this. Any ideas?

A. *It is worth asking why a user would want to access or provide what is often expensive and time-consuming services on a local level, when "excellent" services can be acquired from a central location. Except in those relatively rare cases where the user is just a very independent and self-contained individualist, the likely answer is that he or she sees the central provider as either more expensive (not just in dollars, but in other resources, such as time), not knowledgeable enough, not accommodating enough, or just too far away. If you want to be the central provider of responsive and user-oriented computing services to everyone on your campus, then these issues should be examined in some depth. You might start by offering to run the local computer labs without moving or changing them (at least for the time being). That way, you would relieve the financial and support burden from the departments, and can ease into a more standardized approach once you have built up some trust.*

Q. We have just completed our administrative information system, all developed in-house over the last four years. This has been an expensive project, and our financial vice president has begun to raise the possibility that we might try to sell our software to similar institutions in order to recoup some of our investment. Is this a sensible idea?

A. *It could be, if approached in a very business-like way, but it is a road fraught with risk. Your system will need to be integrated, relational, very well documented, robust, and bug-free. You'll need to find out what other colleges are looking for in a system (which may or may not match your system, so you may need to make modifications at additional cost to you). You will also need to look very closely at your competition—the software companies, many of whom have been serving this marketplace for many years. Approach this cautiously, and do a business plan.*

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THE EDUTECH REPORT

July 1993

Volume 9
Number 4

The Education Technology Newsletter for Faculty and Administrators

The Role of the CIO in the Curriculum Change Process

by John Swearingen, Bryant College

The traditional non-involvement of the college or university CIO in the planning and development of curriculum is no longer appropriate. We academicians, while often delightful people, typically fail to engage in extensive long-range planning, to consider adequately the impact of information technology across the curriculum (both in terms of the teaching process and in terms of course content), and to integrate concepts or applications across disciplines or departments. But the nature of information technology is such that these issues must be considered if IT is to make the maximum contribution to institutional achievement of educational objectives. In many institutions, the CIO is the single individual able, and in the strongest position, to foster the dialogue necessary to ensure consideration of these issues.

On the other hand, the CIO has many responsibilities other than curriculum. Participation in the curriculum change process may become just another facet of his or her role—a facet with which both the CIO and other members of the institution may be uncomfortable.

Two major issues stand out; the first is that we need to determine the appropriate role of the CIO in the curriculum change process and the second is that we must define the professional and personal preparation that will best enable the CIO to fulfill that role. I have used two sources of information in helping to address these issues. The first is a recent survey done of the members of the CIO-L list server and the second is a panel discussion held at the 1992 CAUSE conference.

Responses to the survey questionnaire suggest that curriculum change is typically done through a formal, academic process to which only faculty and academic administrators have access. Direct participation

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"Users are the key to any technology partnership's success. A mere 'classroom of the future' approach basically is faulted in the beginning because it lacks real impact beyond a single experiment or a narrow group of limited-interest users. But a 'campus of the future' approach impacts and involves many, if not most, potential users. Its critical mass suggests a long-term commitment to change the education environment, which causes a number of individual users to participate. Change becomes more worthwhile to them."

Ray L. Steele
Ball State University
"Partnering: Myths and Realities"
Technos
Summer 1993

NEWSBRIEFS

WARNING FROM THE FBI ABOUT BOMBS

The FBI has sent electronic mail messages to computer science departments at many universities warning faculty members to be on the alert for packages which may contain bombs. An unknown bomber who has been targeting computer science faculty on university campuses since the 1970s struck again in June, critically injuring David Gelernter, director of undergraduate studies in computer science at Yale University. The FBI advises that "caution should be used with any package containing excessive postage, incorrect titles, misspellings of common words, or no return address."

EUIT SESSION AT SNOWMASS

EDUCOM will be holding its Educational Uses of Technology (EUIT) 8th Annual Summer Meeting in conjunction with the annual Snowmass (Snowmass Village, Colorado) meeting this year on August 4–6. **[See accompanying article on page 3]** The conference is designed for those "people who make computing in the curriculum really happen," including academic computing professionals, faculty members, and information technology vendors. This year's theme is "Connectivity and Community" and will focus on the issues and challenges of integrating information technology into the teaching and learning process. Sessions currently being planned include a panel discussion on information technology collaborative learning and new learning communities, a professional development session on Internet tools and resources, and a plenary panel of college and university presidents meant to stimulate the discussion sessions to follow.

For more information, contact EDUCOM/EUIT, Suite 600, 1112 Sixteenth St. NW, Washington, DC 20036; (202) 872-4200.

CALL FOR NOMINATIONS

Nominations are due July 30, 1993 for the Awards for Achievement in Managing Information Technology. The awards recognize individuals from business, education, and government who "have made significant contributions to their organizations, and often their industries, through exceptionally effective use of computer and communications technology." Previous winners from higher education are Bernard W. Gleason from Boston College and Richard A. Detweiler, who was with Drew University when he won the award, and is now president of Hartwick College.

The awards are cosponsored by Carnegie Mellon's Graduate School of Industrial Administration and American Management Systems. An awards ceremony will be held in New York City in May 1994; winners will be presented with a Steuben eagle sculpture and an honorarium.

For nomination forms and further information highlighting the accomplishments of previous winners, contact Mrs. Jan Dodson, American Management Systems, 1777 North Kent Street, Arlington, Virginia 22209; (703) 841-5830.

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The Shaping of EUIT

EDUCOM's acronym, EUIT, denotes the "Educational Uses of Information Technology," a label broad enough, yet sufficiently focused, to encompass the activities that will emerge over the next six months from a planning process that must respond to a range of practical issues. EDUCOM is inviting attendees at this year's EUIT meeting (Snowmass, August 4–6) to participate in discussions exploring these issues. Speakers will include Richard Detweiler, President of Hartwick College; George Connick, President of the University of Maine at Augusta; Jack Wilson, Director of Rensselaer Polytechnic Institute's Center for Innovation in Undergraduate Education; Susan Perry, Director of Stanford University's Departmental Systems Group; Susan Saltrick, Director of New Technology Development at John Wiley & Sons, Inc.; and Peggy Seiden, Head Librarian at Skidmore College.

EDUCOM President Robert Heterick, Jr. and the EDUCOM Board of Trustees recently emphasized their commitment and responsibility to EDUCOM's member institutions to help realize the potential of information technology to enhance the "effectiveness and efficiency" of teaching and learning. William H. Graves, Associate Provost for Information Technology at the University of North Carolina at Chapel Hill, has agreed to assume a lead role in creating an attendant agenda of EDUCOM-initiated activities. The goal is to formulate a plan for EDUCOM's approval in early 1994.

The plan is to include a well-defined, nationally scalable project designed to validate that technology-mediated learning can be both effective (contributing to the quality of learning) and efficient (achieving a ratio of result to cost that exceeds the current ratio). The plan should lead to a set of self-sustaining national programs.

In this context, EDUCOM has structured the 8th Annual EUIT Summer Meeting to help redefine EUIT as a set of EDUCOM-initiated planning, implementation, and diffusion activities having the potential to confirm that information technology is a lever for more effective and efficient learning. Speakers, panelists, and discussion group leaders at the EUIT Summer Meeting have been asked to shape their presentations and discussions accordingly, centered around the issues below.

Educational efficiency: What efficiency ratios or productivity measures can be applied to technology-mediated learning? How can they be assessed and compared to current measures of educational efficiency? Can effectiveness increase with increases in efficiency? Is there an academic language suitable to such discourse?

The sociology of academic change: Incremental change is more likely to succeed than radical change, but changing the credit-for-contact model of educational delivery is a radical notion. Is such radical change necessary to the goal of educational efficiency? If so, how can it be achieved at low risk?

Design criteria: What are viable criteria for developing a scalable demonstration to validate that technology-mediated learning can be both efficient and effective? Should such a project focus on a specific discipline or profession, or on general education? Should the selection of a project be driven by a particular educational problem or by the educational possibilities of a particular technology?

Enabling technologies: What technological foundation is most likely to engender a successful demonstration project? What are the relative merits of traditional distance technologies, such as two-way video broadcasts, versus the Internet as a data network increasingly capable of providing access to repositories of textual, numerical, aural, and visual data? What architectural or system standards are important?

Participation in EUIT: There are many human and institutional determinants of educational efficiency and effectiveness—faculty members and their disciplinary societies, campus officers and their national organizations, technology officers and their national organizations, technology support professionals and their national organizations, information professionals and their national organizations, accrediting agencies, educational publishers, information publishers, computing and networking companies, foundations, and government agencies. Who should participate in EUIT activities in the broadest sense? How should the broadest participation be structured relative to past practice and relative to other models?

Project partners: What partnerships among the many possible individuals and institutions are most likely to result in the financial and professional synergies required to create and implement a successful and scalable national demonstration project?

EDUCOM is seeking advice both from seasoned participants who traditionally have contributed their ideas and energies to EUIT and from interested newcomers. For more information, contact EDUCOM at (202) 872-4200. ■

MEMORANDUM

To: President Stevens

From: Jim Smith

Subject: Our Internet Connection

This is in response to your memo regarding our impending connection to the Internet. The issues and concerns you raise about inappropriate material on the Internet are ones our sister institutions are grappling with as much as we are. As you state in your memo, there is a tremendous wealth of material available on the Internet, and the quality ranges from excellent to questionable. Many of us are very concerned that the reaction to the questionable material could be so strong that "the baby gets thrown out with the bath water." We are working very hard with our colleagues at other institutions to address this. We are also working with others who have experience in this area; librarians, for example, have faced many of these same issues for years.

You are also correct in your statement that a lot of the material available over the Internet is not edited. However, this is changing in some areas as electronic publishing begins to come of age. There are numerous moderated discussion groups. Some groups are experimenting with publishing refereed papers. Plus, we are beginning to see other good tools, such as indices for journals, published online.

Much of the information available to Internet users comes through discussion groups. One way to handle some inappropriate material is to do what many of our institutional colleagues are doing: they make information available from USENET NEWS to their users, without making some of the more questionable material, usually contained in the ALT newsgroups, available. As it turns out, we have other reasons for wanting to do this as well; receiving ALT newsgroups requires a tremendous amount of disk storage space that we presently do not have. For both of these reasons, then, we are not planning to implement that feature right away.

Many of us are concerned about the censorship issues that this raises. However, I have talked with our General Counsel and she tells me that even though some people will view this restriction as censorship, we can do it because we are a private institution. Our implementing this sort of restriction would be more questionable if we were a public institution.

You need to know, however, that through public access connections, such as HYTELNET and GOPHER, to other institutions on the Internet, our users can get to ALT newsgroups and similar materials that we are not making available. Although using these connections is fairly easy, exactly how it is done is not very straightforward. Again, because we share your concerns about access to inappropriate materials, we will not publicize how to make these connections.

It should be noted that in addition to the more controversial discussions, ALT newsgroups also include discussion groups on such topics as model railroading and mythology. In working with our advisory group (composed of faculty, staff, and students) about implementing Internet, the first person to ask for the ALT discussion group was from the Religion Department -- Father O'Brien wants access to the mythology discussion list!

We know that you will be the "complaint department" the day someone finds someone else looking at objectionable material obtained over the network, or the day a parent learns about some of what is available. Our recommendation is that the "party line" answer, to be used when someone complains about what "Johnny found on your computers" is that, "Johnny didn't find it; Johnny went looking for it." In a sense, it is somewhat analogous to calling a 900 phone number or seeking out certain books in a bookstore.

We are prepared to give you a demonstration of Internet access, at your earliest convenience, so you can see for yourself many of the fine materials available electronically. It is also very important to keep the issue of objectionable material in its proper perspective. In my opinion and in the opinions of many throughout higher education, this is a situation where the advantages of communication among peers, access to libraries and other resources, collegial exchange of materials, and access to computers worldwide outweigh the disadvantages surrounding a fraction of the material that some students might access.

I am happy to discuss this with you further. I'd also like to suggest that you meet with our advisory group so you can hear firsthand how many of them plan to use the Internet to enhance their teaching, research work, and communication.

This response from the fictional CIO, Jim Smith, was actually written by Ardoth Hassler, Executive Director of the Computer Center at The Catholic University of America.

BEST COPY AVAILABLE

The Role of the CIO in the Curriculum Change Process ...

continued from page 1

in this process by the CIO is usually infrequent, and when it occurs, it is on an *ad hoc* basis, more likely at the behest of an individual faculty member than as a partner in the overall process.

Recipients of the questionnaire were asked to assess the degree to which they perceive their participation to be necessary, and to give reasons for their answers. Three general conclusions may be drawn from their comments. First, CIOs participate in curriculum change to a lesser degree than they believe appropriate. They view their participation as needed both from the view of obtaining the information required to provide adequate and appropriate resources, and from the perspective that IT should be (or become) a more significant part of curriculum content or of the overall learning process.

Second, CIO participation in the curriculum change process may be as much a matter of the personal characteristics of the CIO as of one fulfilling the professional responsibilities of his or her position.

Finally, the traditionally academic process of curriculum change is not something upon which the typical CIO feels comfortable intruding. Whether this is a cause or a consequence of the lack of participation in the process was not clear.

The CAUSE'92 panel addressed and extended the issues raised by the questionnaire in the general categories of the present and future roles of the CIO; the personal skills needed; and critical factors, problems, and issues.

The Present Role

The degree of involvement of the panel members in the curriculum development process at their home institutions runs the gamut from *ad hoc* involvement with individual faculty members seeking advice to formal participation on the committee governing undergraduate education, with each panelist serving primarily as an operational or technical resource as opposed to a policy making or strategic resource.

The New Role

The desired role differs significantly from the current role; all panelists seek a more active role. Each expressed the desire to participate more fully in curriculum change and suggested that their participation is becoming increasingly more crucial. They see the mode of participation, however, as changing from "IT content" to facilitation of a "process."

The new role is seen, for example, as one which encourages, or even sponsors, discussion among faculty with regard to uses of IT in the instructional process as well as one which may include espousing a particular institutional vision within the formal curriculum change or approval process. The current role of the CIO in the academic process is yet ill-defined and to a degree, the CIO and his or her staff may play similar, *ad hoc* roles, both within the curriculum process and within the larger institution. The appearance of the new role may come about simply as a result of a maturing process wherein the roles of the CIO and IT staff become separated, with the existing role inhering in the staff, and the CIO taking on an academic role similar to the strategic, visionary role they perceive themselves having in the administrative milieu.

The position of the CIO within the hierarchical reporting structure is especially significant—visions are created at the top! If, as CIO, one wishes to promulgate a vision of the role of IT within the organization, one is likely to be most effective when reporting near the top of the organizational hierarchy. This is also likely to aid CIOs in gaining credibility with academicians, not for their technical prowess, but rather as a supporter of and advocate for the faculty.

Personal skills

The personal skills necessary to fulfill the new role will differ more in emphasis than identity from those presently expected. Certainly technical skills will still be required; panelists perceived credibility as a primary issue, and still consider credibility to stem from a perceived competence with technology. The success of a CIO in the new role, however, will be based more on the acquisition of appropriate personal and interpersonal skills than on an understanding of technological intricacies.

Creativity, flexibility, and the ability to conceive and articulate a vision will become of paramount importance. Until faculty at large become more aware of the larger role of IT both in the curriculum and in society, it may well be that the CIO may be called upon to provide the "vision of IT" around which the institution operates both administratively and academically.

The CIO of the future will also need the ability to "think in the future," to accurately envision the role of information technology in our personal lives, in business, and

John Swearingen is an assistant professor in the computer and information systems department at Bryant College. The members of his CAUSE'92 panel were Alton Brantley, Penn State University; Lynn DeNoia, Bryant College; Barbara Horgan, Seattle University; and Harry Reif, James Madison University.

in society while maintaining a pragmatic approach to ensure that change actually occurs.

Finally, given that the future role of the CIO is viewed as a facilitator, one who asks questions rather than one who provides answers, interpersonal skills will become increasingly more important. If the CIO is indeed to be a facilitator of the use of information technology in the teaching/learning process, especially among faculty of diverse disciplines, he or she must learn the language of instructional methodology in addition to the language of technology. The CIO of the future may well be selected on the basis of his or her ability to communicate, especially the ability to listen, rather than on the depth of his or her technical knowledge.

Critical Factors, Problems, and Issues

In terms of their role vis-a-vis the curriculum change process, panelists perceive three different kinds of critical issues: organization-based, faculty-based, and curriculum-based.

At the organizational level, one of the roles of the CIO is to ensure that the use of IT in the curriculum falls within the context of the overall organizational strategic plan. In many institutions, this may require that the CIO foster the development of such a plan, and then develop, in conjunction with the faculty, a plan for the use of IT in the curriculum. In addition, changes in the role of the CIO may be dependent upon the institutionalization of his or her participation in the process. A problem then is the formalization of the role in this academic process.

At the faculty level, panelists highlighted two problems. The first is the need to increase credibility among faculty, again underscoring the importance of "people" versus "technical" skills.

The second problem is caused by a dichotomy within the faculty ranks between those in positions of "leadership" in curriculum change (characterized typically by the younger, more mobile faculty members) and those in "control" of curriculum change (the older, tenured faculty). In many instances, the CIO may be the professional to form the bridge between these two groups.

There are at least two curriculum-based problems. First, the role of IT in the existing curriculum is as yet ill-defined. For the most part, IT appears in present curriculum models to fill the role of providing information, but in many cases, what, when, and in what form has yet to be determined. Second, we may be at the beginning of a change in curriculum philosophy to that of problem-based learning. The role of IT in a problem-based curriculum changes from providing information to providing access to information and providing models with which to organize and analyze information.

A Common Thread

In viewing the present and future roles of the CIO in the curriculum change process, we see a common thread—the absence of a universal role. The appropriate, and perhaps the possible, role will depend on the nature of the institution, and on the specific personal characteristics of the CIO. As we emphasize people skills, the personal nature of success, especially in an *ad hoc* role, will continue. Unless the role of the CIO becomes formalized within the institution, the existing diversity of roles will persist, and in the future, increase. ■

"Does educational technology work? It depends upon which version of the question you are asking. Feasibility is different than cost-effectiveness, which is different from impact. This is part of the reason why the question is so controversial since a valid answer according to one interpretation is not satisfactory for another."

Greg Kearsley
"Educational Technology: Does It Work?"
Ed-Tech Review
Spring/Summer 1993

In Future Issues

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EDUTECH RESPONDS

Q. How can we overcome resistance to change? We are switching to a new system in a few months, and many of the users, especially at the clerical level, are openly antagonistic to the prospect. They don't see how much better things will be for them; they only want to keep things the way they are. Is there any way to combat this?

A. *Usually, people resist change because they are concerned about the unknown outcome, particularly if they feel they may not be able to handle it. One of the key issues here is training and preparation. The users, including the clerical staff, need to know that they will not just be thrust into a new world and expected to cope, having to fulfill their responsibilities as they do now but with a new set of tools that they will not know how to use. There is nothing worse than contemplating an upcoming deadline knowing you are going to have to meet it without your familiar and comfortable environment—even if that environment is old, inefficient, and out-of-date. Systems designers and installers often take the training issue for granted, but it is every bit as important as the software. If you begin now to talk to the users about a specific training program, one that is individualized and supportive, one that encourages people to try things out without feeling dumb or inferior, you may see some different attitudes about change begin to emerge.*

Q. This will probably sound silly, but we can't decide whether faculty secretaries are academic or administrative computer users. It makes a difference, particularly in the software they are using, especially for word processing—administrators use an AS/400 mainframe-based package (Displaywrite) and faculty use a PC-based one (WordPerfect). This means that faculty cannot use their secretaries to edit documents, etc.

A. *The problem isn't really whether the secretaries are academic or administrative; the problem is in not having a compatible computing environment for all users. The problems you are experiencing now are only going to get worse unless you address this soon. This does not mean, by the way, that all users have to use the same software and hardware; it does mean that compatibility standards need to be established.*

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THE EDUTECH REPORT

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Seven Basic Principles of Dealing with Vendors

At one time or another, every higher education information technology professional has to deal with a vendor. Whether it is for software, such as a major campus information system, or hardware to replace the computers in the academic computer center, dealing with vendors sometimes can be a daunting task. And it can be especially difficult if many people from the institution are involved at once, as would happen when a vendor selection committee is used. But having seven principles in mind in dealing with vendors can help.

The first principle is to deal with the vendors as equals, neither treating them as inferiors to do the bidding of the institution, nor as superiors to be intimidated by. The latter can be especially problematic. Most vendor representatives, of course, believe that they are perfectly nice people, not in the business of intimidating anyone. But, in fact, they often do, even if it is not on purpose. There are certain vendors who have a reputation of being aggressive. On one hand this can be an inevitable outcome of being a highly successful, confident company; that attitude will show and might be inadvertently off-putting. On the other hand, some companies do have overly arrogant and aggressive representatives—this should not be tolerated. If these representatives reflect the whole company, the vendor should be taken out of the running early during the selection process (as one higher education CIO put it recently, "If the courtship is abusive, what can you expect from the marriage?"); this is a perfectly legitimate reason to eliminate a vendor from further consideration. If it is just one representative, he or she should be replaced by someone who understands the culture of the institution better.

Another form of intimidation is more insidious. It has to do with the vendor getting between people at the institution with the result that the

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"Very few institutions will be on the so-called 'leading edge' of the technology revolution, but none can escape the risk-taking and wrenching changes that will be necessary to accommodate its own mission and peculiar identity. Every institution will be the site of its own convulsion, and each will contribute something unique to our collective effort to advance learning, education, and culture."

Vartan Gregorian
President, Brown University
Keynote Address
"Technology, Scholarship, and the Humanities"
Summary of Proceedings
September 30–October 2, 1992

NEWSBRIEFS

GILBERT MOVES TO AAHE

Steven W. Gilbert, formerly with EDUCOM, has joined the American Association for Higher Education (AAHE) to develop new projects involving information technology. AAHE is a national organization of more than 8,000 individuals, primarily faculty and senior academic administrators (over 2,000 presidents and chief academic officers), dedicated to improving the quality of American higher education. Its membership covers the full range of colleges and universities.

AAHE wants to help institutional leaders and other campus citizens use information technology and resources to serve their daily needs and long-range goals for instruction and scholarship. AAHE technology projects will seek to accomplish this by building better bridges between those with expertise in technology and information resources and those with expertise in teaching. AAHE technology projects will include tasks such as forming a new AAHE Technology "Action Community"—a group of individuals committed to developing collaborative information technology-oriented projects and working with other individuals, groups, and programs within AAHE; finding effective applications of information technology to advance the goals and continuing operations of AAHE's major programs (Teaching Initiative, Assessment Forum, Academic Quality Consortium, Forum on Faculty Roles and Rewards, and School/College Trust); and developing strategic alliances with other associations, disciplinary societies, and industries.

For more information, contact Steve Gilbert, director of technology projects, AAHE, One Dupont Circle, Suite 360, Washington DC 20036; (202) 293-6440; Internet AAHESG@GWUVM.GWU.EDU.

THE WORLD OF COMPUTER NETWORKS

The Institute for Academic Technology (IAT), a partnership between IBM and the University of North Carolina at Chapel Hill, will be putting on a live satellite broadcast, "Exploring the World of Computer Networks," on September 30, from 1:00 to 3:00. The broadcast will examine the ways computer networks can enhance teaching, learning, and research, and will explore the futures of the Internet and the national information infrastructure. For more information, contact IAT at (919) 560-5031.

NEW BOOK ON TOUCHTONE REGISTRATION

The Association of Collegiate Registrars and Admissions Officers (AACRAO) has announced the publication of a new book, *Touchtone Telephone/Voice Response Registration: A Guide for Successful Implementation*. Edited by Melanie Bell, the book covers the evaluation, selection, design, and implementation processes for telephone registration and other systems using touchtone/voice response technology. $35 for members of AACRAO; $50 otherwise. Contact AACRAO Publications, One Dupont Circle, NW, Suite 330, Washington DC 20036.

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Readings for the Summer Doldrums

Collegiate summers are never really the quiet, peaceful, boring times many outside higher education imagine them to be. Nevertheless, with so many potential meeting attendees on vacation, so many fewer classes in session, and so many more hours of daylight, there does seem to be a bit more time to catch up on things. This summer brings with it a collection of fine information-technology-related publications, if not exactly beach fare, at least destined to be very useful as the new academic year begins.

The first is *The Electronic Campus: A Case History of the First Comprehensive High-access Academic Computing Network at a Public University*, by Jon T. Rickman and Dean L. Hubbard ($14.95; Prescott Publishing; PO Box 713, Maryville, MO 64468; (800) 528-5197). The university described is Northwest Missouri State, and this book tells all in chapters ranging from "Building an Infrastructure" to "The Impact on Students" to "Where Do We Go From Here?" Furthermore, you do not have to be a public university to profit from this book; many of the discussions are applicable to all institutions, especially about such things as their maintenance philosophy ("restrict variation in hardware and software") and confidentiality (special design considerations needed).

The eleventh entry in the CAUSE Professional Paper series: *Reinvesting in the Information Job Family: Context, Changes, New Jobs, and Models for Evaluation and Compensation*, by Anne Woodsworth and Theresa Maylone ($12 for CAUSE members; $24 otherwise; CAUSE Publications, 4840 Pearl East Circle, Suite 302E, Boulder, CO 80301; (303) 449-4430), is fully consistent with what we have come to expect from CAUSE. It is pertinent, useful, and well-written. The paper reports the results of a study designed to determine the similarity or dissimilarity of jobs in academic computing and libraries in selected universities, and to test a methodology for measuring their similarities and comparability. It explores the idea that professionals who manage information in higher education—whether from the computing or the library community—could be considered part of a single "job family." As mentioned in the press release, this paper will be of interest not only to computing professionals and librarians, but also to personnel officers who must deal with the challenge of creating new human resource strategies in the rapidly changing world of higher education information technology.

This summer brings with it a collection of fine information-technology-related publications, if not exactly beach fare, at least destined to be very useful as the new academic year begins.

Contract Management or Self-Operation: A Decision-Making Guide for Higher Education is a study done by Coopers & Lybrand and sponsored by the Council of Higher Education Management Associations ($25 for members of CAUSE or EDUCOM; $50 otherwise; available through either organization or through CHEMA, One Dupont Circle, Suite 500, Washington, DC 20036). Given the economic pressures on higher education today, and the need to make every decision be a cost-effective one, this is a very timely and important book. Although not limited to just the potential outsourcing of information technology services, it does bring a necessary and useful way to look at this issue objectively. As clearly stated in the preface, there is no one right answer for every institution; some will argue for outsourcing, some will argue against, and both sides may have valid points. And the decision is not just to be made on an institution-by-institution basis, but on a function-by-function basis, thereby allowing the institution the flexibility to outsource only when and where it makes overall sense to do so.

The second and latest in a series of Executive Strategies Reports from the Higher Education Information Resources Alliance (HEIRA) is *What Presidents Need to Know About the Future of University Libraries: Technology and Scholarly Communication*, a synopsis of a study prepared for the Andrew Mellon Foundation. The synopsis was done by Ann Okerson for HEIRA (the synopsis is $5 from CAUSE; the full 235-page report is $8 from the Association of Research Libraries, Office of Management Services, Publications Office, 21 Dupont Circle NW, Suite 800, Washington DC 20036; (202) 296-8656). The report outlines the "sensitive financial pressure points" for university libraries and offers possibilities for addressing them through a significant increase in electronic text distribution and storage. The report also touches on many of the issues requiring resolution in the transition from printed formats to alternative types of scholarly communication. ■

The Professional Implications of Electronic Information

by Carolyn C. Lougee, Stanford University

Of the many issues raised by the proliferation of electronic information and its impact on the academic profession, some of the most obvious concern the issue of professional advancement. There is the question of scholarly research: whether the profession will consider electronic publishing analogous to print publishing or view creating databases as equivalent to producing a critical edition of a text.

However, these problems, which are chiefly matters of form, may be relatively transparent and easy to solve in comparison to the more complex and far-reaching questions related to teaching as a factor in professional advancement. For example, can we adopt current ways of evaluating teaching to acknowledge and reward efforts in electronic instruction? If not, can we change current reward structures to accommodate new developments?

Current practices in American colleges and universities present formidable obstacles to faculty involvement with electronic instructional resources. Such time-consuming activities as developing new software lack prestige and are devalued in advancement decisions, which leaves little incentive for the individual teacher beyond the intrinsic reward of helping students. To reward faculty innovations in electronic instruction, American institutions must address three specific problems.

First, faculties must establish a peer-review process to evaluate computer software for quality and effectiveness. Second, review and tenure committees should consider software development to be an extension of teaching and should reward it as such. Third, if electronic instruction is to be an effective yardstick, institutions must address the current imbalance between the importance of teaching and the importance of research in tenure decisions. They must convince the American professorate that teaching is the lifeblood of colleges and universities, the *sine qua non* for their primary support and for their patronage by students.

Beyond the issue of professional advancement, the proliferation and application of electronic information resources may affect other aspects of academic practice. Unless academic professionals, especially in the humanities, resist the trend, electronic information resources will accentuate professional ties over institutional ones, depersonalize the community of teachers and learners, exacerbate inequalities, and infringe on the professorate's monopoly on higher education. The centrifugal effects of electronic resources may bolster scholarly autonomy, but the integrity of the professorate and our ability to fulfill both professional missions (of teaching and research) depend on collegial solidarity within the institution. Technology, in addition to turning faculty attention outward, may decentralize instruction, sweeping aside the traditional rationale for the university as "a place of concourse."

The prospect of remote broadcasts of courses, reduced faculty, unused campus buildings and abandoned student services raises crucial questions about the future shape of the academic profession. Telecommunications could change the sharing of courses—"super courses"—with state-of-the-art features beyond the reach of individual professors. But who would be anointed to teach these courses, and would they be able to copyright and receive income from them, as some scholars do videotapes? If they were sponsored by universities, would the institution have an interest in regulating their content? If such courses were widely used, would degrees cease to be university-specific? Electronic instructional resources could relieve faculty from time-consuming lecture courses, allowing them to reinvest time in tutorials and more personalized instruction, or the number of faculty in American institutions could simply decrease. Differential access to computer hardware, software, and services could also exacerbate inequalities among students, institutions, and disciplines.

Although the humanities were at

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In the early fall of 1992, the Getty Art History Program and the American Council of Learned Societies organized a conference on the subject of "Technology, Scholarship, and the Humanities: The Implications of Electronic Information." The conference was also sponsored by the Research Libraries Group, the Coalition for Networked Information, and the Council on Library Resources. The conference participants were a diverse group including working scholars, librarians, technologists, leaders of national institutions, academic administrators, and the leaders of learned societies. Unlike many such gatherings, it concluded with calls and plans for action on a variety of fronts to assist members of the scholarly community in creating, disseminating, and exploiting electronic tools that suit their intellectual goals.

A volume of the summaries of five working papers and other material produced for the conference has been recently published as a *Summary of Proceedings*. Two of the summary working papers are here, reprinted with the permission of the American Council of Learned Societies and the J. Paul Getty Trust.

The Institutional Implications of Electronic Information

by William Y. Arms, Carnegie Mellon University

Electronic information and computer tools have irrevocably changed the nature of scholarship, and universities must provide the leadership necessary to manage this change. At Dartmouth and Carnegie Mellon, the success of campus-wide computing initiatives was directly attributable to the strategic vision of their respective presidents, John G. Kemeny and Richard Cyert, both of whom overcame resistance from reluctant faculties.

Unfortunately for many universities, the arcane and inflexible processes by which they allocate resources can hamper the development of new, nontraditional projects using electronic information technologies.

New initiatives require new funding, and in tight economic times this means making hard choices. But such choices are being made in some places, and each year the portion of university budgets overall devoted to computerization and support staff increases. Granted, existing electronic libraries are far more modest than the bold projections of the 1980s would have led many to expect. They are typically still small, expensive, and difficult to use. However, they constitute only the first step in a revolutionary process, and we can expect them to constantly expand and rapidly improve.

This growth in electronic resources has become increasingly important to the humanities. It has stimulated a growth in experimental interdisciplinary scholarship. Projects such as the computerized *Oxford English Dictionary* have engaged the cooperation of lexicographers, computational linguists, corporate funders, and a range of administrative support personnel. As computerization permits humanists to work on larger, integrated projects, along the model of the experimental sciences, we need to bridge the traditional cultural divisions among scholars, librarians, computer programmers, and technicians.

In addition, as humanities scholars adopt hypermedia and digital technology, humanities faculties will have to adjust the traditional tenure evaluation processes. They will need to rethink the current criteria which is based on books, monographs, and articles and to redefine scholarship to include new forms of electronically-based research and instruction. It seems unreasonable that innovative electronic teaching and information programs must be re-expressed in printed form before review and tenure committees can evaluate them as scholarship. It seems much more reasonable to grant electronic publishing the prestige and acceptability that is currently afforded to print publishing.

The potential of electronic information to foster large, experimental research projects in the humanities points up some significant differences between the fundings of humanistic and scientific scholarship which need to be addressed. The scientific community has long funded its capital-intensive projects with a great deal of support from government and industry. In contrast, only two percent of humanities research funding comes from the government. As a result, the humanities can undertake only a few large, interdisciplinary projects unless the government and other funding agencies perceive the outcome to benefit the entire academic community (as was the case with the Commission of Preservation and Access). More money for research is needed, and our universities are not rich enough to raise it on their own.

At the same time, the university library is declining in importance relative to other information sources. Any college, department, or individual can mount its own information on computers, thus becoming part of a national electronic library service—in effect, an open library. Given the importance of electronic information to the future of libraries, institutions should begin to implement changes now in resource allocation, including the withdrawal of conventional services, such as the card catalogs, when the new services have proved their worth. No institution can afford to maintain duplicate services. To fund this transition, universities must allocate new money. ■

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Seven Basic Principles of Dealing With Vendors ...

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institution is no longer able to act as a united entity. This kind of disunity often occurs between the computer center director and one or more of the users, such as when the director apologizes to the vendor for the behavior of a user (for instance, at a software demo where the user might be asking a lot of tough questions). This director may need to be thought well of by the vendor, seeing the vendor as technically superior and more business-oriented, and could be concerned about what the vendor might think if one of the users "gets out of line."

Another form this takes is one or more of the users indicating to the vendor that they think their computer center director is weak. This can be really dangerous territory, and an institution can end up making some big decisions for all the wrong reasons. If a specific vendor is part of those decisions, it can turn out badly for everyone involved.

It is important to deal with the vendor as an equal, and to not be intimidated, no matter how technically proficient the vendor is, no matter how well-dressed the reps are, or what kind of cars they drive. There is no such thing as a stupid question, nor does the vendor have the right to make anyone at the institution feel stupid or inadequate. A vendor who responds "what would you want to do that for?" to every question should be shown the door quickly.

The second basic principle, especially during a vendor selection process, is to keep a level playing field among all of the vendors by being as objective as possible at all times. It is best to resist all of the vendors' attempts to make things uneven by buying dinner or visiting campus uninvited. Also, anything one vendor says about another should be filed away as an important piece of information—about the vendor who said it.

The third principle is that even though the dealings with vendors should be as objective as possible, the institution's subjective impressions of the way it is being "handled" or treated are also important. The vendor should give the institution the impression at all times that they highly value the institution's business, that they see the institution as an individual one with unique characteristics, and that they are able to respond to people at the institution in a personal way. Putting up with too much boilerplate is unnecessary (and can be ultimately detrimental), not just in written material, but in personal interactions as well.

> ***Even though the dealings with vendors should be as objective as possible, the institution's subjective impressions of the way it is being "handled" or treated are important, too.***

The fourth principle is that the institution should be in control of the relationship at all times. A solid information base, a well-thought-out strategy to deal with vendors, a unified institutional face, and a clear set of objectives will all help to maintain control.

Fifth, it is important not to rush things. Especially in the case of choosing major software systems or hardware that will serve the campus for many years, this should be treated as a long-term project of lasting benefit to the institution. It deserves a careful, deliberate, collaborative and collegial process. The institution should not feel pushed into making a decision before it is ready just because the vendor is saying things like, "We would like to book this income before our fiscal year ends, so we're making you a very special, never-to-be-repeated deal."

The sixth principle is that although it is always important to be decent, polite, and courteous, the institution does not "owe" the vendors anything beyond that courtesy and whatever has been negotiated in a business arrangement or contract. In other words, no one at the institution should feel guilty about being business-like. For instance, the institution is not under any obligation to tell a vendor why it did not pick the vendor's software system. Especially in the sales process, whatever the vendor does is built into the cost of doing business and into the price of the product, including such things as putting on an on-campus demonstration. Generally, the vendor has not done anything special for the institution beyond normal business practices. Let decency prevail in all interactions, of course, but no sense of guilt.

And finally, especially since we are talking about information technology, it is best to always maintain a healthy skepticism. Be wary of products or services that look too cheap, that seem too easy, or that can be available too fast. Without being unduly cynical, assume that if it looks too good to be true, it probably is. ■

The Professional Implications of Electronic Information ...

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risk even before electronic information resources began their transformation of the university, the "information age" could put universities under increasing pressure to turn out scientists and engineers, relegating the humanities to the status of frill. Additionally, academics must recognize the potential of the new technology to undermine the professorate's monopoly on advanced education. While the road to a professional career, whether in the sciences of the humanities, presently runs through the university, the electronic university of the future may lose out to competition from the increasingly popular "corporate college."

It is certain that the decade in which we face the challenge of integrating electronic information resources into our professional lives will be a time of unprecedented budget constraints. Responsibility for bringing the university into the information age will be the most important professional implication of all. ■

Editor's note: In addition to the working papers, the conference developed a set of common themes:

1. Initiate a collaborative effort to pursue an advocacy role for the humanities in today's expanding electronic environment. Working with existing organizations, enter the current dialogue on the direction of new information technologies to serve the humanities.

2. Promote, as a national priority, the creation of a 10-million-volume digital library to encompass the full spectrum of humanities research collections.

3. Ensure that humanities scholars participate in decisions affecting the creation and selection of electronic research resources and in the development of policies to facilitate access to those resources.

4. Identify and develop exemplary collaborative programs, projects, and individuals that demonstrate the effective creation, sharing, and distribution of electronic information in the humanities.

5. Collaborate within and outside the humanities in the development of standards for the exchange of, access to, and description and preservation of electronic research.

6. Investigate how the humanities can use information technology to increase, reallocate, examine, and generate resources in new ways.

7. Adjust the current definition of scholarly research and instruction to reward innovative uses of electronic information and media.

8. Enlist humanities scholars to interpret the impact of information technology on society, and promote critical understanding of the role that information technology can play in both research and teaching.

9. Sponsor initiatives that provide opportunities for training and that enrich the mixture of information technology and the humanities. ■

"Here at the University of Virginia, many students will be expected to buy their own computers beginning next year. We've wired the dorms for networks, and the bookstore is set to offer special package deals on PCs. So what's missing from this picture? A course in Personal Computers 101. We make future writers study chemistry and make future chemists study English literature, but we don't teach our students the most necessary occupational and cultural skill: how to use a PC. The fact is, our institutions can't handle an issue that is scarcely a decade old. Greek mythology is better supported than personal computers."

Will Martin
Letter to the Editor
PC Magazine
August 1993

In Future Issues

- *Hot Issues '93-'94: higher education's most pressing information technology issues*
- *Identifying certain users for maximum impact*
- *Jurassic Computer Center: can it survive?*

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EDUTECH RESPONDS

Q. We have recently formed an Operations Committee of all of the directors of information technology services on our campus (there are six of us in total) in order to coordinate not only our activities but also our plans for future initiatives and proposals for funding. It worked well up to a point, but then we hit a snag: in presenting our most recent proposal to provide new desktop equipment for faculty members, we did not have unanimity on the committee about how this should be done. As a result, some of us worked "behind the scenes," effectively destroying any credibility our proposal may have had, and maybe even destroying the credibility of the committee itself. How do we prevent this from happening again? Do we have to have unanimity on every issue?

A. *There is a difference between unanimity and consensus. The former, implying an exact match of opinions among all members of the committee, is much more difficult to achieve; the latter, indicating a general agreement on an issue, is usually sufficient in most cases. Assuming this is an institutionally sanctioned committee with some authority, it should be the responsibility of each member to voice whatever discord he or she may be feeling in the committee first. It is the chair's responsibility to make sure everyone has had a say and has taken the opportunity to present opposing views. Proposals can be carried forward with a consensus even if there is not unanimity, and they can also be carried forward with "minority opinions."*

Q. I find the whole business about reengineering very peculiar, especially since the word implies that there was some engineering to begin with. I think one of the biggest problems we face is that no one has ever done much of anything with structure, including organization, planning, budgeting, building teams and workgroups, and so on, and that what we have today is the result of no engineering at all.

A. *Too true. Information technology, it seems, has always suffered from a fire-fighting mentality. This is somewhat understandable because of the inherent volatility of the environment, but increasingly intolerable in the larger higher education environment that requires stable, long-range, cost-effective, user-friendly solutions.*

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THE EDUTECH REPORT

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The Education Technology Newsletter for Faculty and Administrators

Hot Issues 1993–94

Our annual round of calls to our readers this August confirmed what we had already suspected: there is really only one Hot Issue this year. It was discussed in any number of ways, called many different things, but all of the sentiments came down to this: resources are dwindling as demand for services is increasing; how do we match these opposing forces without dying in the process? Whether it is "downsizing," "reengineering," or just a quest for greater efficiency, the goal is virtually identical from institution to institution. Being creative about this, not getting overwhelmed or discouraged by the task, keeping up staff morale, and continuing to forge ahead are this year's major challenges. The good news is that as everyone becomes more resigned to this situation, more accepting that this is not just a blip in a longer, more resource-abundant cycle, the ideas for coping get better.

The other good news is that the downturn in resources is affecting everyone in our institutions, not just information technology, and as a result, users are increasingly inclined to see technology as part of the solution (as opposed to part of the problem, which is a burden IT has been living with far too long). Users, and the decision-makers both they and IT report to, seem more amenable this year to incorporating the use of information technology into their own efforts at downsizing and streamlining. In a way, this, coupled with the increasing classroom and faculty use of technology, makes the situation much harder for IT managers; as one respondent put it, "You can't mandate expectations the way you can mandate staff size." But we also heard from many that it is easier to make at least certain things happen now for certain users, especially when those things are accompanied by the expectation of greater efficiency. All of a sudden it seems, IT is entering hero country, and institutions seem to be seeing IT in a more positive light.

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"Above all, the teacher who wishes to demystify the computer and erase technophobia must model and encourage patience. He or she must reassure students that computers are not easily broken, that lost work is not the end of civilization, that their skills are strengthening. Technologically proficient, the teacher must accept all questions, even the embarrassing ones, with equanimity and answer not as an authority but as an informed friend."

Gary Earl Ross
State University of New York
"Strategies For Addressing Technophobia in Nontraditional Freshmen"
Collegiate Microcomputer
May 1993

NEWSBRIEFS

TWIGG JOINS EDUCOM

Carol Twigg, formerly the Associate Vice Chancellor for Learning Technologies for the State University of New York and Director of the SUNY-Empire State College Center for Learning and Technology, is joining EDUCOM to assume a leading role in EDUCOM's new Teaching and Learning Initiative. EDUCOM president Robert Heterick says that Twigg's arrival emphasizes the importance that EDUCOM is placing on this new project.

The Teaching and Learning Initiative will invite the participation of a range of institutions and individuals in activities designed to demonstrate increases in educational effectiveness and efficiency through technology-mediated learning. Twigg has published and given conference presentations on such topics as the impact of telecommunications on restructuring higher education and training, the need to improve productivity in higher education, engaging college faculty in using educational technology, and managing academic computing systems in a dispersed environment.

For more information about the Initiative, contact EDUCOM at 1112 16th Street N.W., Suite 600, Washington DC 20036; (202) 872-4200.

TECHNOLOGY FIGURES PROMINENTLY IN THIS YEAR'S NACUBO AWARDS

Each year, the National Association of College and University Business Officers (NACUBO) presents awards to those institutions that have achieved the greatest cost reductions through innovative new programs. This year, the use of technology figured very prominently in the awards, with **Iowa State University** receiving the highest honors for its image processing system in the financial aid office. Other awards were given to **Grand Valley State University** for a touchtone credit card payment system, **Rutgers University** for a PC-based property and space management system, the **University of Maryland/College Park** for a telephone fraud detection and elimination system, and the **University of Texas/Dallas** for automating its news release distribution. For more information about the Incentive Awards program, contact NACUBO at One Dupont Circle, Suite 500, Washington DC 20036; (202) 861-2500.

ACUTA SEMINARS

The Association of College & University Telecommunications Administrators (ACUTA) has announced its 1994 seminar schedule. The Winter Seminar, covering "Planning the Telecommunications Infrastructure" and "TQM and Organizational Structures" will be January 9–12 in Palm Springs, California. The Spring Seminar, covering "Hot Management Topics" and "Campus Cable TV" will be April 24–27 in Baltimore, Maryland. The Fall Seminar, covering "Network Planning and Management" and " Student Services" will be October 16–19 in Richmond, Virginia. For more information, contact ACUTA at 250 West Main Street, Suite 2420, Lexington Financial Center, Lexington, KY 40507; (606) 252-5673.

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Can This Project Be Saved?

Scenario: After a lengthy and thorough selection process conducted by a college-wide committee, this institution chose a new administrative information system and new hardware. As soon as the contracts were signed, an implementation plan and a schedule were put together by the vendor working in concert with the information technology department; the project plan called for the first module to be Admissions, with a go-live date in four months.

For a variety of reasons, the first deadline was missed, pushing the go-live date much further into the peak processing period for Admissions. Furthermore, the users were working under the assumption that all of their old reports were going to be duplicated in the new system. The need for an Admissions office procedure manual came up suddenly, and whose responsibility it was to write it was never clear. More deadlines were missed as specifications were changed and more reports were added to the project deliverables. Meanwhile, the vendor was trying to install a new version of the software, and while the new version had many advantages and new features, it also had a lot of surprises.

Nearly a year after the first original deadline, significant portions of the Admissions system have yet to go live. The Admissions Office users are angry and frustrated. The rest of the users are cynical about the project ever being accomplished. The IT department is feeling overworked, abused, and discouraged. College management is demanding to know what's gone wrong. Can this project be saved?

The first problem that needs to be attacked is putting the locus of responsibility for the success of the project in the right place: with the users. While it was a college-wide committee that successfully made the software selection, when it came time to plan and implement the project, responsibility shifted inappropriately to the IT department and the vendor. This left the very people who had the most stake in the success of the completion of the project—the people who made the selection—virtually out of the loop (except as service recipients).

At this point, the relationship among the three critical parties:

Nearly a year after the first original deadline, significant portions of the Admissions system have yet to go live.

the users, the IT department, and the software vendor, needs to be reinvented. A user-based committee should be established (with luck it can be the original selection committee) whose responsibility will be to drive this project, including specifying deliverables, setting deadline dates, and specifying and acquiring resources. The committee should rely on both the IT department and the software vendor to be its resource for information and service, but not for project direction.

The second thing that has to happen is to establish a set of realistic expectations, shared and understood by everyone. A full and detailed set of what gets delivered and when needs to be completely planned out, with the plan being sensitive to the institution's resources, user and IT office schedules and workloads, and software and hardware availability.

There also should be a change order process put into place. The users will want to make changes and additions; this needs to be built in as a given rather than as an unfortunate and occasional exception. There is really nothing wrong with changes to the system (especially if the system is improved as a result), as long as the users understand all of the costs (both time and money) associated with the changes and are in a position to make intelligent decisions about whether each one is actually worth doing.

Finally, there needs to be a contingency planning process going on more or less all the time. In a project of this magnitude, it is inevitable that something will go wrong, whether it's late delivery of a critical hardware component, an unexpected bug turning up in the software, or a key person leaving at a crucial time. There should always be a Plan B to fall back on to deal with the unexpected.

Can this project be saved? Yes, if the right steps are taken now. The whole process, which began with a successful selection, needs to get back to being driven by the users; realistic expectations need to be set, agreed to, and understood by everyone; and contingency plans have to be developed to cope with unforeseen developments. Once there are some definable successes, even if they are just small ones at first, everyone will begin to be more optimistic about the potential for overall project success. ■

Hot Issues 1993–94 ...

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Within that framework, this is what's on the minds of those who deal with higher education information technology:

Achieving a one-to-one ratio of people to computers. More and more it seems that the ultimate goal for IT management is to make sure that every faculty member, every student, and every administrator has a computer. Not many places have achieved this yet, but each year, more institutions put the attainment of this ratio into their planning processes. As one respondent put it, "All this time, we've been struggling with issues such as how many computers we should be putting into the public labs; how the available funds for micros should be apportioned among the faculty; whether an administrator should have a terminal into the mainframe or his or her own micro. These are the wrong questions now. The right questions are more like, how long will it take before every faculty member gets a computer, and what is the fastest way to get there?"

On this latter issue, we heard about 75/25 financing splits (institution/faculty member) for any faculty member who wants a computer, fully institutionally financed micros but over a three-year period, and even a full realization of the one-to-one ratio through staging microcomputer distribution based on seniority. ("We were very surprised by some senior faculty who we thought wouldn't go near them, who are!")

New administrative information systems. Without a doubt, every college and university in the U.S. is either looking for a new system, in the process of installing a new system, or wringing their hands trying to figure out how to pay for a new system. Interestingly, mainframes still figure very prominently in the world of administrative systems, and as one person put it, "People are still trying to figure out what client/server means." On the other hand, there is rapidly increasing movement toward graphical front-ends for the systems.

The number-one issue in administrative systems is data access: how to provide it in the most user-friendly and economical ways, even perhaps while holding onto "legacy" systems. The general feeling among our respondents was that the software vendors are still further behind in this issue than they should be, and that data access tools just have to get better. No one thinks SQL should be inflicted on the users!

> *The good news is that as everyone becomes more resigned to this situation, more accepting that this is not just a blip in a longer, more resource-abundant cycle, the ideas for coping get better.*

Campus-Wide Information Systems. In our interviews, this became the catch-all phrase for many different efforts: providing everyone with a network connection (major focus this year on extending existing campus networks to dormitories), dealing with security and access issues for administrative data, and even having everyone on campus using the same electronic mail system (as opposed to two or more systems that don't talk to each other). Several institutions with whom we spoke are heavily involved in developing the defining architecture for the CWIS, including the design of a common user interface throughout the system.

And of course we heard our Hall of Fame Issue: everyone continues to complain about how fast things are changing in the networking world and how difficult it is to make decisions (and to pay for them!).

Focus on the customer. Beyond the fact that it is very trendy to talk about this in IT circles, many of our respondents indicated real efforts to emphasize customer service, and that the efforts were paying off. One of the most prevalent mechanisms for doing this appears to be the establishment of user-based advisory committees to help monitor service levels and shape priorities.

Still a lot of consternation about planning and budgeting. Yes, it's necessary, but it's also impossible. "You put in a budget request in January for something, and by the time you can buy it when the new fiscal year starts in July, either your needs have changed, the item itself has changed, or the price has changed. The technology is moving too fast to be locked into these old ways of budgeting."

As for long-range planning, there is no question that it is expected of most IT managers, but many with whom we spoke regard it as an exercise in futility. The sentiment seemed to be that while the process itself was beneficial in terms of promoting a collegial and consensus-driven approach to decision

making, and while it was useful to focus on the defining of the institution's priorities and goals and whether IT could be useful in fulfilling those goals, the specific plans that emerged from these efforts were not very useful. "We might decide that all faculty members have to have a computer within three years, and then when year two comes around, there's not enough money in the institution's budget to continue to fund this program. Where does that leave us? In some ways, worse off than if we had never planned for it, because we ended up raising expectations that can't be fulfilled. So now we're in a position of having said at one point that computers are extremely important to the educational process, and now we're saying but not important enough to find the money to pay for them."

Other ways to manage tight resources. As we mentioned earlier, IT managers are getting more creative in their approaches to dealing with the resource situation. As one respondent put it, "I think of this as the shopping cart and the hill: we used to have to push the cart up the hill to get people to use technology. We used to have to 'market' ourselves. Then we somehow reached the top, and now we are rolling back down the other side—the users are demanding things much faster than we can provide them." These are the coping strategies we heard:

Not just outsourcing, but cooperative outsourcing: sharing an outside service provider, such as a microcomputer repair person or a telephone switch service rep with another nearby institution. That way, neither institution has to pay for a dedicated service, but can work cooperatively with each other to handle the peaks and valleys of service needs.

Getting away from paper: more and more emphasis on on-line information. "We need to get away from printing everything out." This will not only reduce paper (and paper storage and disposal) costs, but it will also lead to greater efficiency in the long run by eliminating an increasingly unnecessary step in almost every process. "I received a newsletter over the Internet the other day, and after reading it on my screen, I redistributed it to three other people on my campus; they read it on their screens and then we exchanged e-mail about the contents. No paper." On-line purchase orders, on-line service tracking systems, more use of imaging documents, and faxing directly from and to computers all were mentioned.

> *Without a doubt, every college and university in the U.S. is either looking for a new administrative system, in the process of installing a new system, or wringing their hands trying to figure out how to pay for a new system.*

Reevaluating priorities. Now more than ever, it is important to make sure that what IT is working on is what's most important to the institution, and most in line with the institution's priorities. One way to do this is to get the senior administration involved in setting the IT department's direction, rather than just being a rubber stamp. "Until recently, we felt we might be 'bothering' the senior administration with these matters. Now we know we need their direct involvement."

More emphasis on open systems. This is not new, but we heard much more of it in our interviews this year, possibly because open systems are becoming a much more viable choice. We are even seeing traditionally proprietary systems taking steps to become more open, such as Digital's VMS operating system and IBM's AS/400 computer. Specifically mentioned as a resource-saving mechanism, relying on open systems is the clear trend.

Investment in training. This is one of those items where spending money will save money in the long run, and it applies to everyone: IT staff, users, and senior administrators. "All the important issues have to do with personnel and staffing, not with hardware and software." "The right people are so hard to come by, that once you have them, you'd better do what you can to keep them; that mostly involves keeping their skills up-to-date and giving them the opportunity to keep learning new things."

Leasing equipment, especially microcomputers. As a way of spreading costs over several years, and especially with interest rates being so low, this seems to be becoming a very attractive alternative to outright purchase. ■

Note: Over one hundred people were interviewed for this article, and we thank them all. We especially thank David Smallen, **Hamilton College**; Paul Morris, **Tufts University**; Robert Fry, **Assumption College**; Charline Mahoney, **Merrimack College**; Roger Lawson, **University of Vermont**; Ron Dumont, **St. Anselm College**, and Bernard Gleason, **Boston College**.

Technology is Not That Different

One of the ideas that makes it difficult for college administrators to deal effectively with technology is that it is somehow fundamentally different from any other college resource. Many high-level administrators, especially presidents, are convinced that some "special knowledge" is needed to make major decisions about technology, such as allocating resources and determining priorities. And because many of them do not have that special knowledge, they feel unprepared to deal with these important issues.

But technology is not that different from any other college resource. It is newer. Some of it is more expensive. The guts of it are incomprehensible to the average person. But, in fact, these are not important differences. There is nothing special about technology. The "special knowledge" one must have to understand how technology works is not needed to understand how to deal with technology and how to manage it properly.

Let's use the analogy of the automobile. Most of us today have no idea how an automobile works. Many of us have spent countless hours sitting through explanations of internal combustion to no avail. Many a driver of a Mazda RX-7 hasn't the faintest idea what a "rotary engine" is or why it's different from other engines.

But there is a great deal that most of us do know about cars: We know how to drive them. We also know how to drive cars other than the one we own. We know how to choose car accessories. We know how to buy a car, we know how to rent a car, we know how to lease a car, and we know how to decide which one is appropriate for whatever circumstance we are in.

On a different level, we know how to associate the cost of a car with its value, so we can figure out how much to spend when we want to acquire a car. We know how to fit car payments into our budgets. We know how to choose between using a car and using a train or an airplane, balancing the three variables of cost, convenience, and comfort.

On a different level still, we know why car transportation is important to us as individuals, why it is important to those around us, including our families as well as our colleagues, why it is important to the organizations we work for and belong to, and finally, why it is important to our country. We know how car transportation fits into the overall transportation scheme along with pickup trucks, campers, vans, and eighteen-wheelers.

> *There is nothing special about technology. The "special knowledge" one must have to understand how technology works is not needed to understand how to deal with technology and how to manage it properly.*

We know all these things about cars, and a lot more. Generally, if we have had any special training, it was just a driver's ed course to learn how to operate a motor vehicle and to learn the traffic laws. But that's probably it. All the other knowledge we acquired through exposure, osmosis, and just daily living. Most importantly, we acquired it because it was expected that "normal" people would and could do this.

There are two basic points here: most of us don't think of ourselves as having any special knowledge about the concept of automobile transportation in order to have successfully and effectively incorporated cars into our daily lives. In addition, we don't have to know how an automobile works in order to use one to its fullest extent. Technology is no different.

The Hiring Decision

One of the tasks that many administrators find onerous is hiring a technology manager, such as a director of computer services. Using our premise, this is not any different from hiring any other resource manager, such as a director of the campus libraries. What do we look for in a library director?

1) Experience in a college environment, because college libraries are different enough from other libraries so that the experience in the latter is not sufficiently relevant.

2) Experience in delivering library services to the community. Especially important is the appreciation for how best to support the educational goals and objectives of the college as carried out by the faculty. We want someone who will be an advocate for library usage and someone who will make the library fully accessible to the community.

3) An understanding of the role of the library both in the overall institution and in higher education in general, along with a vision for how that role might change over

the years. Experience in long-range planning for college and university libraries.

4) An understanding of basic library operations, such as circulation and acquisition, and ideas about how to make those operations as efficient as possible in a service-oriented environment. Experience in both budgeting for library operations and managing librarians.

5) An understanding of how printed resources fit in with other kinds of resources in delivering an education to college students and in aiding faculty research.

Most college administrators would not be uncomfortable in taking these criteria into a search process and coming out with the right person. Technology is no different. Each one of the characteristics above could (and should) be used to select a director of computer services, substituting computing experience for library experience.

And as important as the selection criteria are, there are also things we do not look for in a library director, such as knowledge of how publications are produced, including typesetting, graphic design, press runs, binding options, etc.

One of the pitfalls that many institutions encounter in hiring a computer services director is in requiring that the candidate have a degree in computer science. The fact is that a computer scientist has no more insight into how to be a computer services director than an English professor has. To use one more analogy: we would not ask someone who knows how to design and build television sets to advise us on how television should fit into our lives. We have questions such as: How much should we pay for a new TV set? How many sets should we have in each of our homes? Should we subscribe to cable TV? What are the likely effects of educational TV on our children? We don't ask the person in charge of TV research and development at Motorola these questions. He or she is concerned with designing and creating the resource, not in managing it. Similarly, we should not expect a computer scientist to know how to manage, plan for, and organize computer resources on our campuses, because he or she is no more prepared to deal with those questions than anyone else.

Does it help to have a computer science degree? Only insofar as attaining the degree has provided some insight into the potential of technology to transform the educational experience. But many other degree holders have acquired this insight as well. The computer science degree has most likely done nothing to teach the person how to manage technology resources.

In future issues, we'll talk more about how dealing with technology is not substantively different from dealing with any other important college resource. **Next: Why we don't need a Chief Blackboard Officer.** ■

"Legislation—NOT! There have been repeated calls for new copyright legislation aimed at addressing the apparently unique needs of digital networks and libraries. But legislation can be like shooting a gnat with an elephant gun: you may get rid of the gnat, but you might blow your house down. Instead of more legislation (inevitably focusing on today's technology, as tomorrow's emerges from the wings), we need to work within and apply the current copyright framework, and apply it as it has been applied successfully before to new media and new conditions."

John Garrett
National Corporation for Research Initiatives
"Electronic Libraries and Copyright"
Query
Summer 1993

In Future Issues

- *Customer service: the transcendent information technology resource issue*
- *Identifying certain users for maximum impact*
- *Jurassic Computer Center: can it survive?*

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EDUTECH RESPONDS

Q. We are trying to put forth a plan to our administration to put a new, modern microcomputer on the desk of every faculty member. Some at the institution, however, are advocating that we recycle some of the older equipment to those who may not need as much computing power, thereby lowering our costs. Some of this older equipment is really old, such as IBM XTs. Does this recycling approach make sense?

A. *This is one of those ideas that sounds great on paper, but doesn't really work very well in reality. In addition to the obvious support issues (older equipment breaks down more often), there is another very important issue to consider: if a faculty member does not have a computer now, chances are that he or she needs something very user-friendly, with relatively low barriers to learning and productive usage. The computer world generally defines "user-friendly" today as having a graphical user interface, on-line help facilities, and an intuitive look-and-feel. Since we know that there is a direct correlation between ease of use (of software) and capability (of hardware), that is, the easier software is to use, the more powerful the machine that supports it needs to be, the faculty members who are most likely to be on the receiving end of recycled equipment are the very ones for whom that equipment is the most inappropriate. In fact, they need the same processor speed, memory, and storage capacity that the more computing-adept faculty need. Better to sell the old equipment if possible, or give it to a local elementary school.*

Q. We know in theory that we should have users be more involved in helping our computer services department set priorities. But if we really do that, we know they will never let us do any of the things that will benefit them but that they never see, such as installing a new version of the operating system.

A. *Two points: it doesn't have to be such an all-or-nothing choice. You can give the users control over certain of your resources, while holding in reserve the things you need to build and maintain the infrastructure. Second, you need to be very sure that your department is in the business of adding value to the work of your users, and that the users perceive it that way too. Infrastructure is important, to be sure, but your work also needs to be visible and valued.*

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The Many Layers of Reengineering

Reengineering is an appealing idea in higher education today, even with the staff reductions, the budget cutbacks, and the distaste generated in some by phrases such as "faculty productivity" that are often associated with it. It is rapidly becoming even more appealing as our institutions see the concept as a way to achieve both greater efficiency and greater effectiveness. Rethinking major objectives, reworking major processes, and reformulating major policies all seem to fit in just now with higher education's search for greater accountability, both to itself and to the public at large.

As many have already discussed, the information technology department has a major role to play in the institution's reengineering efforts, and may even serve as the institution's leader, or at least as a role model for others on campus to follow. The goal, as many have said, is not to do more with less, but to do different with different. Rethinking and reshaping the IT department has become a major new focus for many of us.

But what does reengineering the information technology department really mean? The idea itself has evolved from a rather basic approach involving restructuring spaghetti programming code to a much more complex set of issues and behaviors threading through the entire department. What we need to look at now is a multi-layered process, involving changes at the philosophical, intellectual, emotional, cultural, and procedural levels. We need to achieve success on all five of these levels in order to gain the full benefits of reengineering.

Achieving success involves movement away from one way of doing things toward another way. In the "old days" (five or ten years ago), we all used to do things pretty much the same way; data processing

continued on page 4

"Even the most computer-illiterate educator can see the threat implicit in the technology. For the first time, the flow of knowledge need not be vertical. It is becoming horizontal, and the teacher is far from crucial to its transmission.... Yes, computer technology can and will transform the schools. But it will be a process that many educators will resist bitterly, because it will also transform their role. As someone recently observed, the teacher will not be 'the mentor at the center, but the guide on the side.' "

Crawford Kilian
Capilano College
"On-Line Education: The Forums of Anarchy"
TECHNOS
Fall 1993

NEWSBRIEFS

NEW SURVEY ON TECHNOLOGY, TEACHING, AND SCHOLARSHIP

The American Association for Higher Education (AAHE) has announced its role as a sponsor of the Fall 1993 Technology, Teaching, and Scholarship Survey of college faculty, conducted by the James Irvine Foundation Center for Scholarly Technology at the University of Southern California. The survey, also co-sponsored by the American Council of Learned Societies (ACLS) and the League for Innovation in the Community College, will provide a comprehensive profile of the use of computers and related information technology resources in teaching, learning, and scholarship in the nation's two- and four-year colleges and universities.

The survey will focus on a wide range of issues addressing faculty access to, and use of, information technology in teaching, instruction, and scholarship, such as the use of information technology-based resources in instruction; the use of information technology-based resources in research and scholarship; access to and use of on-line information resources; institutional and departmental support and incentives for developing or adopting technology tools in teaching; faculty perceptions of departmental and institutional attitudes toward the use of technology in instruction and scholarship; faculty assessments of the technological challenges confronting their institutions, departments, disciplines, and students; faculty attitudes towards the appropriate role of technology in teaching, instruction, research, and scholarship; basic access to desktop computers; departmental and institutional support for purchasing/providing hardware and software; departmental and institutional training and user support; access to and use of electronic mail and campus networks; and access to and use of national networks.

The survey results will be published as a single report and also as special articles in a number of disciplinary and professional publications. Participating campuses will receive a complete report summarizing the responses of their faculty, plus normative data comparing the responses of faculty at similar types of institutions. For additional information about this project, please contact Casey Green, James Irvine Foundation Center for Scholarly Technology, University of Southern California, 300 Doheny Memorial Library, Los Angeles, California 90089; (213) 740-2327; kcgreen@usc.edu.

COMPUTERS AND STUDENTS WITH DISABILITIES

The Equal Access to Software and Information (EASI) project is sponsoring a one-day seminar on answering the new challenges to education brought about by the Americans with Disabilities Act. The seminar is designed to offer strategies for developing and enhancing adaptive computer technology services at schools and universities. The seminar will be held on November 12 at Howard University in Washington D.C. and November 19 at Medger Evers College in New York.

For more information, contact EASI at P.O. Box 1278, El Segundo, California 90245; (310) 640-3193.

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"It's Customer Service, Stupid"

During the last presidential campaign, the most oft-quoted slogan in the Clinton camp was "It's the economy, stupid." Signaling a need to stay focused on this one, universally affecting issue, the slogan made an indelible point with all who worked on the campaign. The success of the candidate says a lot about the effectiveness of this single-minded strategy.

If there is one overriding issue for campus information technology departments, one issue that is above all others in importance, one issue that affects everything else that goes on in the department, it's customer service. Without great customer service, the department has no credibility with the users, no standing in the institution, no trust from the administration. With it, many other deficiencies can be forgiven.

The IT department needs to commit to the basics of great customer service. Specifically:

Make it a priority to meet all deadlines. Structure projects so that realistic deadlines are set jointly with users, and then see that they are met, always, no excuses. Include contingency plans for things that happen beyond anyone's control.

Establish regular communications with the community, both formal and informal. Make sure that every department throughout the institution is met with formally at least once every six months, even if there is no concrete reason to do so. Make sure that all long-range and strategic planning efforts involve the users in substantive ways. Have high-level IT staff hold widely publicized "open door" hours on a regular basis, just to chat.

Have every project and every initiative begin with a user-driven needs analysis. Involve users on the project team. Make sure users have a stake in the success of the project by maximizing their involvement. Don't start anything unless the users are willing to justify the need for the project to their own managers and to the institution's administration.

Present a picture of austerity to the community. Recognize behavior and activities that give the impression that the IT department is a bunch of spendthrifts, and eliminate them.

> *Without great customer service, the IT department has no credibility with the users, no standing in the institution, no trust from the administration. With it, many other deficiencies can be forgiven.*

Commit to seeing things from the user's point of view. Subject every project, every initiative, every system, and every data structure to a non-technical, user perspective. Always figure out what educational and/or administrative purpose is to be served.

Adopt a "customer is always right" attitude. Behave as if IT were only one of many organizations competing for users.

Commit to supporting the technology resources that are already in place. Rather than exclusively focusing on new initiatives, make sure everything already on campus works reliably, all the time. Also make sure the user community is fully educated as to the availability and functionality of resources.

Expand the list of IT supported products. Slowly and methodically, try to give the users more choices without their having to take the risk of non-support from the IT department.

Don't talk jargon. Don't assume the users always know what you mean. Don't think they're dumb because they don't live up to your expectations of what everyone should know. Also, don't use jargon in any reports or correspondence meant for other departments.

Make everything clear. Spell out service level agreements. Define terms that can have different meanings, depending on your point of view, such as "fast" and "downtime."

Survey users regularly to see what they really think of your services. The bottom line question to ask the users: If you had to pay for this service, would you?

No matter how many other problems people had last fall, the economy was the most important one to almost everyone in the country. The Clinton campaign recognized that and focused on it almost exclusively. Recognizing that great customer service is the most important thing to the end users will have the same result. Clinton won the campaign; the IT department will win the hearts and minds of the users. ■

The Many Layers of Reengineering ...

continued from page 1

departments and computer centers were generally recognizable from campus to campus—backroom, centralized, fairly inflexible operations, offering only a very limited set of choices and solutions to end users. At the other end of the spectrum is a very different sort of organization, one that is much more visible, much more distributed, and both flexible and nimble in its approach. When IT departments reach that end, they will have achieved the ultimate objectives of reengineering.

The Philosophical Layer _____
The first layer that needs to be dealt with is the philosophical layer. The whole philosophy of what it means to provide *service* needs to change, and is, in fact, already changing in many campus IT departments.

At one time, the computer center was an isolated outpost on campus, most likely in a basement somewhere, available only to those intrepid enough to get through (getting through physically was usually the least of it). The changes we are seeing now are twofold. They are certainly seen in the outreach of the department, in terms of the department being more visible, more proactive, and more inviting.

The changes are also seen in the increased coordination among all information technology service groups on campus: administrative computing, academic computing, audio/visual services, voice communications, data communications, and so on. Even for institutions that have not actually combined these functions organizationally, there is much greater tendency toward cooperation among them, including such things as planning, budgeting, sharing of staff, sharing of other resources, and of course, providing services to end users.

Both the new philosophy of outreach and this increased merging and blending of functions is leading to a much more user-friendly environment: both shop-at-home and one-stop-shopping for users to be able to put together a solution made up of many different pieces of the technology.

The Intellectual Layer _____
It was not so long ago that computer people and end users did not have very much to say to each other; or, rather, they had a lot to say, but couldn't bridge the communications gap very well. The intellectual component of reengineering compels each side to understand the other.

Computer people have to go beyond just an understanding of the technology they use; they need to understand how the technology can be applied to solving a user's problem; for that, they need to understand what the problem is in the first place. They have to know what users are trying to accomplish, and to understand what the environment is that users deal with everyday. They need to know the user's business, whether that is the Sociology Department doing data analysis on large datasets or the Admissions Office trying to bring in a more culturally diverse class of entering freshmen.

On the other hand, users need to get beyond the assumption that the computer people will always be the ones to provide them with solutions, and to better understand themselves how to apply technology to a problem. We have seen a lot of progress here with the proliferation of microcomputing, but there is a long way to go yet.

In the intellectual layer, we see both sides beginning to come together in the middle ground between them—the understanding of both the possibilities and the constraints of the other side.

	The Old Way	Making the Transition	Fully Reengineered
Philosophical	The Data Processing Department and the Computer Center as the locus of control; inflexible	The Computer Services Department sharing control with the users	The Information Technology Services Department with control not an issue; flexible
Intellectual	Computer people and users complete mysteries to each other	Users understand computers more and more	Computer people understand the users' goals, objectives, and tasks
Emotional	Computer people seen as "high priests;" aloof; condescending	Computer people seen as nice guys, but sort of "out of it"	Computer people seen as partners with the users
Cultural	Most-heard phrase from a computer person: "Just tell me what you want, and I'll do it for you"	Most-heard phrases from a computer person: "I can't do that for you now" and "You can't do it that way"	Most-heard phrase from a computer person: "Here's how we can do that...."
Procedural	Major task: programming in COBOL and FORTRAN	Major task: programming with fourth-generation tools	Major task: providing solutions built on tools, services and purchased software

The Emotional Layer _____
Computer people have traditionally been seen by the users as aloof and condescending, especially the technical experts. In fact, the expectation used to be that the more technological expertise a person had, the less he or she was likely to have tolerance for working with end users. In many institutions, systems programmers are still in the back room, conversing, if they do at all, only with each other (and an occasional operator when it's time to do an operating system upgrade).

The transition that we are in now seems to be marked by a friendlier attitude, to be sure. Many of the language barriers are beginning to disappear, and computer people are often held now, perhaps not in so much awe, but certainly with a great deal of esteem by the users. Because the computer people are more approachable and less intimidating, the users can approach them more often with the expectation that they will actually be helpful.

But, unfortunately, the transition is marked by something else as well: a perception on the part of the users that the computer people really don't know what's going on at the institution. Computer people are generally not called upon to sit on institutional planning committees, or to voice their opinions about general institutional matters. Even though the computer people are generally more approachable, and are seen as being more helpful than in the past, many major activities still take place, such as new building or renovation projects, without the input of the computer people.

In the reengineered world, computer people and end users will be partners, working together as equals to bring technology to bear on the institution's problems, challenges, and opportunities. Each group will be seen to have its own capabilities, strengths, and talents, and in a spirit of teamwork and cooperation, projects will be accomplished.

Emotionally, this will be a much more affirming and satisfying state of being—for both computer people and end users. Relationships among people will improve, and everyone will have the opportunity to make a significant contribution.

The Cultural Layer _____
The culture of computing is changing from the old way of doing everything for the users to the reengineered way of being the facilitator for the users doing things for themselves.

Unfortunately, the transition between these two is a rather negative place, and has given many users the impression that computer people are obstructionists. That is, because of limited resources and the almost out-of-control state of the available technology choices, many computer people have taken on a very negative attitude whenever a new idea comes up—especially if the idea comes up from the users. The users often perceive the culture of computing to be one of barriers and obstacles.

Eventually, however, computer people will succeed by reengineering themselves to be the facilitators rather than the obstructionists, and by including users in the formulation of the solutions.

The Procedural Layer _____
This is where the efforts to reengineer the other layers will show up most dramatically. It is here where the end users—and indeed, the whole institution—will actually see the results of this challenging reengineering effort.

The net effect of reengineering the IT department will be in several dimensions. The deliverables will change from software programs to solutions made up of programs (not necessarily done in-house), tools, and services. The choices from which to craft solutions will change from being singular and inflexible to modular and highly flexible. The speed with which solutions are delivered to users will change from slow to fast. The cost to deliver solutions will change from high to economical and affordable.

Summary _____
Attitudes, made up of components from all of the layers will change as progress is made on the other layers. When words such as "flexible," "responsive," and "user-oriented" become more than just words, then the IT department's efforts to reengineer itself will have succeeded fully. ■

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Administrative Computing in UK Universities

Does Any of This Sound Familiar?

***Note**: Since January 1990, a group of five European experts in the field of information technology management has been studying IT's strategic relevance for higher education as part of the activities of the Organization for Economic Co-Operation and Development (OECD), based in France. Giving special attention to top management, this effort is intended to stimulate discussions and assessment of what is occurring on campuses in various OECD countries, and to suggest ways of meeting the challenge of future developments. What follows is a portion of a paper delivered at one of the group's workshops, written by W. Robin McDonough of the Queen's University of Belfast, UK. The full paper is "The Management and Administrative Computing Initiative" and is published in the journal, Higher Education Management, November 1992.*

It was common for a United Kingdom university in the 1980s to rely for its management information on systems which had been developed in the 1960s (and earlier in some cases). These systems had often been moved simply from machine range to machine range as one decade followed the next. The systems which were being used had been developed in the era of batch computing. Information was being provided almost totally on paper and very often it was out of date by the time it was received by individual users.

It is not that the need for change was not realized by universities. In many cases efforts had been made to develop the new on-line systems that would help the area of management information and strategic budgeting. Within universities it was the administrative computing unit which had the responsibility for this work. These units, usually called data processing units, were small and severely under-resourced and did not have sufficient programming resource to develop the systems. Many of these units consisted of just a man and a dog and indeed in some cases the dog didn't exist. Most of the time was spent trying to continue to run the outdated systems which had been developed earlier. There simply was not enough time to develop new systems.

Many of these DP units consisted of just a man and a dog and indeed in some cases the dog didn't exist. Most of the time was spent trying to continue to run the outdated systems which had been developed earlier. There simply was not enough time to develop new systems.

In many cases, the strategy for future development of administrative computing was plagued by conservative thinking. Data processing officers, and for that matter the people to whom they reported, normally finance officers and registrars, still thought in terms of batch computing when the rest of the world had moved on to the concept of interactive and on-line access to information. The need to maintain security was often paramount in their thinking. It was therefore considered unwise to move to a system which might permit more widespread access to information.

The universities also believed in the "we are unique" syndrome. In other words, they believed that the peculiarities of their organizations were such that only systems developed by themselves would meet their particular needs. As a result there was little or no evidence of collaboration amongst the universities in this area. This idea of collaboration was already widely accepted within the academic computing sector and had proved very beneficial in areas such as telecommunications networking and software procurement. However, this idea had little support in administrative computing.

The data processing units also suffered from lack of expertise. The world had moved on and the staff in the data processing units had not kept up-to-date with developments such as networking, communications, and Unix.

Finally, there was a significant amount of administrator apathy, if not downright antagonism. It is significant that a working party report on the provision of information services established by two organizations which represent academic computing and libraries in the United Kingdom found that the administration of universities was, by some considerable distance, the least computerized part. To this day there are still many senior administrators who do not wish to have anything to do with comput-

ing. They regard it as something for their secretaries to do.

It is worth exploring why the administration is the least computerized sector of universities. Is it because the work requirement of the administrator is very much different from other areas? Perhaps it is because he knows that there is an administrative data processing unit within his university and his view therefore is that it is their job to consider the application of computers to administration and not his.

It is certainly true that there is a significant lack of knowledge within the administrative sector about the potential use of computer systems. Many senior administrators graduated from universities at times before which the use of computers in degree courses was common. They now work in an environment in which there has been very little use of computers beyond word processing and even that was something they left to their secretaries.

Have financial constraints in universities had an impact? Perhaps universities have felt that the initial priority for computing facilities must be given to the needs of the academic sector, and therefore the provision of computing facilities in administration must take second place. It is certain too that many administrators, many of whom occupy senior positions within universities, are unwilling to adapt to what is for them a new concept, and are afraid of what that may involve.

But despite all this, the general view of the administrators in universities is one of frustration: frustration that they are unable to have easy access to the information which they need to enable them to carry out their day-to-day work, whether it is on operational activities such as personnel and payroll matters, or whether it is on high-level administrative projects such as strategic planning and budget projection.

It was against this background that the UK Universities Funding Council established the Management and Administrative Computing Initiative. The goal is to fund the development of a suite of information systems which will attempt to meet the needs in both operational and strategic areas. All being well, in two years time, the administration in UK universities will have undergone a quite revolutionary change. ■

"Perhaps the most telling example of our success occurred during a planning meeting for the move to the new building. Department heads were asked what services they absolutely needed to remain productive throughout the move. Several said they could do without phones for a couple of days, and others said that they could wear coats or sweaters if heating in the building wasn't yet stable, but to a person, they all said that they needed access to the network and electronic mail as fast as possible. I hadn't realized how vital that network had become to the operations of the law school until that point."

John Mayer
Chicago-Kent College of Law
"E-Mail *Is* The Campus-Wide Information System"
CWIS
July/August 1993

In Future Issues

- *The annual EDUCOM and CAUSE conferences: still worthwhile?*
- *Why we don't need a CBO (Chief Blackboard Officer)*
- *What we can learn about Help Desks from commercial software companies*

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EDUTECH RESPONDS

Q. We were working on an important project for the Development Office when the computer was struck by lightening. I know this sounds like the dog-ate-my-homework excuse, but it really happened. As a result, we had to regenerate some files and data for the Payroll office so their office staff could continue entering timesheets. It's not that we were expecting medals or anything, but instead of a simple "thank you" from Payroll for bailing them out, we got blasted by the Development Office for missing their deadline. Do we always have to be the bad guys?

A. *Sad, but true; you will always be someone's bad guys if you continue to be the ones who make the decisions about who gets what service. In this case, it probably seemed obvious that you should switch over to Payroll, but letting the users work that out for themselves gets you out of this no-win situation. If it was so obvious, then they would have seen the sense in it, too, and no one would have been blasted. On the other hand, it is possible that the Development work was so important that they might have decided that just this once, timesheets could be done by hand. In either case, it shouldn't be up to you to have to decide who gets priority. Remember, too, that deadlines should be inviolable, with contingency plans that everyone agrees to in advance. Being everyone's good guys begins with honoring your commitments.*

Q. There are people who work in the computer center on this campus that I literally cannot talk to; we just don't seem to speak the same language. Unfortunately, sometimes I have to deal with them, but I try to avoid them at all costs. Is this true everywhere?

A. *No, but it happens often enough to be a fairly widespread problem. It is a communications and management problem, to be sure, but it is also something to which users themselves have contributed. Many users have been too tolerant of the technical prima donnas, even to the extent of encouraging that attitude. In some cases, users are so mystified by technology that they are willing to put up with a what would otherwise be unacceptable behavior from those who appear to have solved the mysteries. Even when they feel mistreated, they will tolerate it—at least up to a point—if they feel dependent on the person mistreating them.*

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How To Do A Help Desk Right

If we take a good look around at the hardware and software vendors who seem to have some staying power in the marketplace —the ones who seem to have generated some real customer loyalty— we also see the ones who seem to have figured out how to do the very tricky business of post-sales support. A customer has the product in hand but has a problem of some kind with it; post-sales support has to diagnose the problem (usually from a remote location), offer advice, and ideally, come up with a solution. Most importantly, even though the interaction is generally not face-to-face, and tends, therefore, to be rather impersonal, post-sales support has to result in the customer feeling well treated. It has been said many times that when a customer has a problem with your product or service, the way the problem is handled is a far more important factor in building customer loyalty than having no problem at all. It is a real opportunity to present the human side of the business, to be helpful, to be a problem-solver. If we think of computer center help desks as the "post-sales support" of the services we provide, we might have quite a bit to learn from successful vendors about how to do a help desk right.

If you have called WordPerfect for help lately, or Adobe, or Lotus, or Microsoft, or any of a number of other successful companies, chances are you know what it's like to have received the type and the amount of help you needed. You probably talked with someone very polite and very knowledgeable, and you probably got your question answered or your distress relieved on the first try. Furthermore, you probably got the feeling that you and your concerns were important to the person you talked with. This doesn't happen one hundred percent of the time, of course, but it happens often enough to make it worth exploring whether there are behaviors or characteristics here that we can adapt to the campus computer center help desk. What are these things?

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"In many ways, we are at a crossroads in our effort to integrate technology into the curriculum, teaching, and learning. We can either take the road that leads to 'business as usual' or take the other that leads to a *paradigm shift.* The latter, no doubt, is filled with uncertainties, emotionally loaded debates, agonies and ecstasies."

Kamala Anandam and Victor Nwankwo
Miami-Dade Community College
Project Synergy
Year Three Report
September 1993

NEWSBRIEFS

THE ASSOCIATION FOR THE ADVANCEMENT OF COMPUTING IN EDUCATION

The Association for the Advancement of Computing in Education (AACE) has announced its 1994 series of three conferences. "Methods and Models for the 90s" is the theme for the Society for Technology and Teacher Education 5th Annual Meeting, scheduled for March 16–19 in Washington, DC. ED-MEDIA 94 World Conference on Educational Multimedia and Hypermedia will be held in Vancouver, Canada on June 25–29, and includes a new track on distance education and hypermedia. The International Symposium on Mathematics/ Science Education and Technology will be meeting to explore the theme "Emerging Issues and Trends" in San Diego, California on July 21–23.

AACE is an international, educational organization whose purpose is to advance the knowledge, theory, and quality of teaching and learning at all levels with computer technologies. For more information on any of these conferences, or about the association, contact AACE, P.O. Box 2966; Charlottesville, Virginia 22902; (804) 973-3987.

PATRICK SUPPES WINS THE ROBINSON AWARD

Patrick Suppes, the Lucie Stern Professor of Philosophy at Stanford University, has been named the 1993 Louis Robinson Award winner for his contributions to the understanding of how information technology can be used to inform teaching and learning. The award honors the late IBM advocate of computer technology application to education, and is funded by IBM. The award winner is selected each year by the EDUCOM Board of Trustees.

As the award citation puts it, "For almost thirty years, Professor Suppes has worked to develop computer-based instructional materials for students at all levels, from elementary school to university undergraduate. He pioneered the use of computers as individualizing tutors for the learning and practice of basic skills in reading, writing and mathematics. At the university level, his courses in Introduction to Logic and Axiomatic Set Theory are taught entirely by computer."

HARVARD BUSINESS SCHOOL CASES NOW ON MULTIMEDIA

Course Technology, Inc. (CTI), a publisher of technology-based educational materials, has introduced the first commercially available multimedia product for business education. The product is produced under a licensing and publishing agreement with Harvard Business School Publishing, and it allows students to learn key international business concepts at their own pace.

Based on three HBS cases, *Managing International Business* help students explore the managerial and organizational issues involved in implementing a global business strategy. The product can be used in international business, organizational behavior, and marketing courses. For more information, contact Howard Diamond at CTI, One Main Street, Cambridge, Massachusetts 02142; (617) 225-2595.

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Adaptive Technology and Higher Ed

by Carmela Castorina, Editor, Project EASI

Robert walked into the classroom and scrambled for a seat in the front row. As the professor of Middle Eastern history shuffled his papers and began his lecture. Robert listened intently—but he didn't take any notes. He just tried to remember as much as he could and hoped that the tape recorder was picking up every bit of information. This class would mean two lectures a week, a lengthy reading list, a midterm, a final, and one 12-page research paper—a pretty standard format.

But Robert's approach to the class wouldn't be so standard. Robert is blind, and he'd already begun making arrangements to scan the hundreds of pages of reading into a computer so that he could Braille it out. He also plans to write that research paper with the help of a computer that uses voice output and a word processor.

For most students, the standard format of a college-level class is no problem. But for some, there are barriers to being able to meet the minimum class requirements.

If a student is blind, he is not going to be able to pick up one of those required books and read it. In fact, he's not even going to be able to pick up the reading list and see what he's supposed to read. And if a student is physically disabled, he may not be able to sit in class and take an exam using pen and paper like other students. How does a college or university ensure disabled students the equal education promised them under federal and state legislation?

One way is through adaptive computer technology. Besides providing access to computer systems that are available to all students on a campus, adaptive computing equipment can be used as compensatory tools that allow people to do tasks that are not traditionally completed on computers.

For example, a hearing-impaired student might be able to use a laptop computer to take notes while she watches an interpreter sign the professor's lecture. Or a student with a learning disability may be able to take tests on a computer that has a software program that outlines and spell checks.

Well-designed, powerful, computing tools can benefit everyone. And while they make things easier for most people, they make things possible for people with disabilities. It's imperative—both as matter of law and as a matter of fairness—that students with disabilities have the same access to campus computing systems that all other students have. What is actually involved in making campus computers accessible to all students?

Academic Computing ——— There are four areas to consider when developing adaptive academic computer technology services: academic computing centers, which must be made accessible to students with disabilities; discipline-specific computing, which might include adapting course-specific hardware and software; print and on-line services such as library catalogs and encyclopedias which must be made fully accessible to students with disabilities; and computers for use as compensatory tools, which might include computerized assistance in reading, note-taking, and exam-taking.

Administrative Computing ——— Increasing numbers of campuses are also using computers for administrative tasks such as student admissions, registration, financial operations, and library services. Access to administrative computing for employees with disabilities is required to meet legislative employment mandates.

Disabled student access to administrative computing must also be provided. For example, telephone registration should be supplemented with a telecommunication device for the deaf or some equally appropriate means of access for people with hearing impairments. Catalogs and schedules should be made available in an accessible format—Braille, large print, tape, or electronically—for students who are visually impaired.

We have a mandate to provide equal opportunities in education to all students. Implementing adaptive computer technology and services is helping us fulfill that responsibility. Fifteen years ago, fewer than 500,000 students with disabilities were able to get the public education promised to them in our Constitution. Today that number exceeds 4.5 million.

While those numbers reflect improvement, they also highlight the fact that we still have a great deal of work to do. With planning and the effective use of technology, we can help provide the equal education promised to all students, and we can also help prepare them to take their places in society and the workforce. ■

Note: *Project EASI (Equal Access to Software for Instruction) is assisting higher ed in developing computer services for persons with disabilities. For more information, contact EDUCOM, 1112 16th St. NW, Washington 20036; 202-872-4200.*

How To Do a Help Desk Right ...

continued from page 1

The help facilities are specialized. If you know you're having a printer problem, you call the help line for printers. If it's a problem installing the software, you call the help line for installation. Yes, this means the user has to do some diagnosis first, and that's not always possible. But in the cases where it is, the user gets the specialized help needed in a more direct and efficient way.

Many computer centers have taken exactly the opposite tack, setting up a single help line and help desk, expecting to be able to answer all questions. Normally, this is done because there are not a lot of people dedicated to this service, and having only a single line, staffed usually by a single individual, is seen to be the most "efficient" way to do this. In fact, many computer centers will argue that users used to complain about not knowing where to go for help; setting up a single help desk relieves the users from having to figure that out; users are no longer getting the run-around.

But is that really true? What happens when the person staffing the help desk doesn't know how to answer the question? After all, no one individual can handle every user's problem; the support people need to defer to the expertise of others when they run across something they can't handle themselves. When that happens, the result for the user is often further inconvenience: the person needed is out that week, or his or her beeper isn't working, or whatever. In addition, even if the user can connect to the right person, it is likely that the whole process took longer simply because the user had to go through an extra step.

What often turns out to be the real reason that computer centers create a single help desk for all users and all problems is that the ad hoc, unplanned, and often difficult requests for answers and services on the part of the users is seen to be an intrusion on the "real" work of the people in the computer center. Therefore, the reasoning goes, if we set up only one telephone line for help and tell everyone to use it, we will "protect" our people from interruptions which distract them from their very intense, intellectually demanding labors. Yes, the computer center would be a great place to work if only it weren't for the users.

> *Successful computer companies see providing this service as a mainstream, vitally important activity, even when it does not earn the company any additional revenue.*

Alternatively, successful computer companies see providing this service as a mainstream, vitally important activity, even when it does not earn the company any additional revenue (as in the case of WordPerfect, for example, which offers free support). It is staffed accordingly; so should be our computer center help desks.

The support people make use of technology themselves. Using technology creatively can both make the provision of service more efficient and help the users get very specific, very targeted help. For instance, there is a very efficient series of help recordings you can step through unattended when you call Adobe, each one more specific than the last, leading you through a set of possible answers (all pre-recorded) until you find the right one.

This doesn't answer every problem of course, but it certainly takes care of many of the most frequently asked questions without having to dedicate a person to the task. At the same time, Adobe does not rely on this exclusively; the caller can break through the recordings to speak with a human being at any point in the sequence. Other vendors provide fax services (for both submitting questions and receiving answers).

Naturally, the idea here is to keep support costs as low as possible. Dedicating people is the most expensive way to provide support, and if there are efficient alternatives—which are also effective—they should be employed.

They let you know how long you may have to wait for an answer. It has been shown time and time again that it is not the waiting that people mind so much; it's the not knowing how long they are going to have to wait. Think of sitting at the airport and being told your plane is going to be late leaving, but the airline isn't sure just how late. You can't call home to tell them not to come pick you up at your destination airport at the prearranged hour, because you don't know what to tell them as an alternative. You don't want to leave the gate to get something to eat, because they might call for boarding while you're gone. It doesn't do any good to get angry because this is all beyond your control. So what you do get is terribly, terribly frustrated. It's not so different for users who are told that someone will get back to them with

an answer to their problem, but when that will happen is anyone's guess.

WordPerfect has a live telephone monitor that gives continual feedback to people in the hold queue waiting for service, as to how much longer they will need to wait to speak to someone. This kind of feedback keeps the frustration level way down, even when the wait is long. By the time callers get to speak to someone, they are still civilized human beings and not screaming out of frustration.

Letting people know where they are in your service queues, whether that's waiting for an answer to a problem, waiting for their micro to be repaired, or waiting for their batch job to run, will make it a lot easier for users to feel good about the service they receive once they actually receive it.

They are always polite and friendly. Even though they may think it, they never say, "Why don't you just read the manual, dummy." They never make you feel stupid, even if the answer has been right there in front of you the whole time. In fact, many of the companies that had statements in their user manuals such as, "When a problem occurs, consult your manual; that's what it's there for" or "Do not call if your question is application-specific; we do not handle that type of question" have, in fact, gone out of business. Customers, or end users, just do not want to be treated that way.

The more effective approach, the one employed by many of the more successful companies is this one (this is from page 11 of the reference manual for WordPerfect for Windows, Version 5.2): "Even the most experienced user needs help on occasion. To make things easier for you, we have provided several ways for you to get the instruction and help you need as you use WordPerfect." It then lists several sources of help, including the reference manual itself, and ends up with this statement: "After you exhaust these sources, and you need a friendly voice to help you, you can call WordPerfect's Customer Support at one of the numbers listed below."

Does WordPerfect want you to read the manual first? Of course they do, so they make that as inviting as possible. But they also know many will not read the manual, and some who do will not be able to understand what the manual says, and some are upset when they're having a problem and afraid of losing their work, and so on. So WordPerfect makes it "okay" to call. And, in fact, they see direct contact with the customer (even if the cause of the contact is a problem the customer is having) as another opportunity to put their best foot forward.

Letting people know where they are in your service queues will make it a lot easier for users to feel good about the service they receive once they actually receive it.

They don't expect you to be a technologist. The people on the other end of the line at successful computer companies do not expect you to be able to describe your problem in technical terms—that's their job. You need to be able to describe the symptoms and to give them as much information as possible about what you're trying to do, but you are not expected to know whether you have both COM2 and COM4 set up for IRQ3 at address 02F, thereby causing a problem when trying to use your mouse and your modem at the same time. If that is something that the person diagnosing your problem needs to know, then they walk you through the steps necessary to provide them that information.

In addition, the support person will often walk you through the steps necessary to solve the problem you are having, while you are still on the phone. They take virtually nothing for granted about what you know and don't know, and even for experienced users, that can be a great relief.

They almost always have an answer. If the support people do not have an answer for you on the spot, they get back to you in a reasonable amount of time with a reasonable response. They know the product they are supporting quite thoroughly, and are prepared to deal with most anything that comes up.

Summary

What can we learn from successful computer companies? The most valuable lesson is that support is every bit as important as the product itself. Support may not be the sole guarantor of success, but without it, success is far less likely.

Support should not be a peripheral activity. Customers, or end users, should not be seen as intruders on our "real" work. Support *is* our work, and managing help desks to convey that message will benefit everyone in the long run. ■

Whiplash on the Information Superhighways

by Paul Dempsey, Shippensburg University of Pennsylvania

***Note**: Steve Gilbert at the American Association for Higher Education (AAHE) has a listserv on the Internet to discuss various issues in higher education information technology. The latest issue Steve has termed "Whiplash on the Information Superhighways," and is about setting realistic expectations for colleges and universities investing in information technology "that won't become an embarrassment of unfulfilled claims in a few years." Paul Dempsey, Assistant Dean of Graduate Studies and Registrar at Shippensburg University of Pennsylvania, came up with an interesting response.*

I have some observations to share on "whiplash" and the related issue of productivity, based in part on my four years of experience as a microcomputer manager. In that position, I provided support for administrative users of computers and also ran student labs and assisted faculty.

One problem contributing to whiplash is the "gee-whiz" approach to new technology. Many people interested in technology tend to focus on all the new toys (faster computers, better graphics, multimedia, etc.) before they have a chance to make the most out of the technology they already have. While it is important to stay on the cutting edge of technology, we must also focus attention on maximizing the use of the technology we already have.

There are two critical ways information technology should be used in higher education. The first is to prepare our students to use the technology when they graduate and go on to the workplace or advanced study. Students with these skills will have an important advantage in the future. The second way, of course, is using the technology as a tool for teaching and scholarship. Access to the Internet is one part of this, as is use of microcomputers for writing, data analysis, etc. Presentation software and multimedia will open up opportunities for changing the way material is presented in classrooms.

Rather than complaining about the need for better and faster equipment, we should try to show what can be done with what we currently have. These "baby steps" may produce results that illustrate the potential for the technology, leading to a greater commitment to spend money.

While it is important to stay on the cutting edge of technology, we must also focus attention on maximizing the use of the technology we already have.

The other part of this discussion relates to productivity. I am skeptical of these studies which show no productivity gains from the use of computers. As a manager, the technology gives me access to data as well as the opportunity to compare and present data, making me function much more efficiently in my job. On the other hand, I have observed that there is not yet the "paradigm shift" in understanding how the technology can be integrated into the workplace. Instead, we squeeze it into the old paradigm and therefore don't take full advantage of the potential.

Adequate support services is a critical factor in the implementation of any new technology. As many of us know, however, this is not a time for staffs to be growing. The irony is that putting staff in this area might bring about those elusive productivity gains. We have had experiences that I suspect are shared by others. Microcomputers were put in most academic departments and administrative offices, but in the vast majority of cases they simply replaced typewriters. A small number of users were motivated and able to learn (mostly on their own) to use spreadsheets and databases, but when they ran into problems they couldn't get the assistance they needed.

Some case studies might illustrate the potential for those elusive productivity gains. When I became Registrar, I studied the process by which schedules were prepared. Department secretaries typed their schedules (on a word processor), then submitted hard copy to their deans. The deans sometimes modified the schedule. They then compiled a college list, which was submitted to my office. My office then entered the schedule on our mainframe to update the academic database so students could register.

I developed a microcomputer program for the departments to use. This program has the current schedule information in a database (extracted from the mainframe). The secretaries can update the information in the database and then print out a report. The database files are sent to the deans, who can combine all their departments and analyze faculty workload and number of course offer-

ings. My office combines the files from all the colleges, cleans them up on the PC, and then uses the PC to automatically prepare the files for the mainframe.

There is nothing earth-shattering about this, but we had PCs in the offices for a number of years before we made this change. The next step is to transfer the information over a campus-wide network; right now we just send disks back and forth.

In another example, I developed WordPerfect merge files for my staff that lets them enter information (such as students approved for graduation) and then use that information for diploma orders, the commencement program, mailing labels, and name cards. This is clearly increased productivity compared to typing each of those items individually.

It is because of my microcomputer background that I was able to do this. Other managers may not have the experience to lead their staffs in using the technology, and that is the reason that a great deal of emphasis should be placed on having technological support people. These people, in turn, need to have more than just technical skills. They need to be able to speak to users and determine their needs. They need to be problem solvers, to see how the technology can be put to practical use.

One more example before I end. We are putting in a campus network, and our computer center people have been trying to change the way we access the mainframe; they want to eliminate the terminal emulation cards and software, and use the network to get to the mainframe. This goal makes sense, but they failed to consider the way people work. In many offices, the terminal emulation software operated in the background, allowing people to use WordPerfect or other software while toggling to the mainframe when needed. Unfortunately, the network software for accessing the mainframe took up much more memory, making it impossible to run WordPerfect. Not only did they fail to consider this point, but they made the change to a number of people without warning. These people started their computers one morning, and found that they had been "improved" in a way that prevented them from doing their work.

The situation has since been fixed, but it is an illustration of how rushing ahead with new technology can set you behind. While technology can help redefine our goals, the focus should always be on the goals and not the technology. ■

"Whiplash is what happens when you're accelerating or cruising and suddenly stop. It's what happens to a faculty member who changes a course to fit the use of a new application of technology and then discovers that the students don't know how to use the equipment. It's what happens when an institution makes a major investment in technology without anticipating the necessary costs of support services and software. It's what happens when a student tries to do an assignment using some of the information resources of the Internet and can't figure out how to log on. Let's help ... our colleagues avoid whiplash when they try the Information Superhighways for teaching and learning."

Steven Gilbert
"Whiplash on the Information Superhighways"
LISTSERV "AAHESGIT" at GWUVM.GWU.EDU
November 1993

In Future Issues

- *State-of-the-art versus state-of-the-practice*
- *The annual EDUCOM and CAUSE conferences: still worthwhile?*
- *Why we don't need a CBO (Chief Blackboard Officer)*

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EDUTECH RESPONDS

Q. We recently brought in a consultant to help us through a rough period in which we were having a great deal of internal disagreement about some technology decisions we were faced with. The consultant's primary attribute was his objectivity, not having any "turf" to protect, and we managed to get through this with his help. My question is that now that he's gone, is there some way we can achieve some objectivity on our own?

A. *There are a number of things you can do, not to eliminate subjectivity and bias (protecting one's turf is a normal, human instinct), but to encourage a broader, institutional outlook among the participants. There are few people who would say that they do not want to do what's best for the institution, and you need to create ways that will encourage them to follow up on that sentiment. First, you need the right committee structure to make sure that enough people with balanced viewpoints are participating in the decision-making process, and that there are lots of opportunities for input from everyone else. Then when it comes time to make a decision, everyone involved needs to agree on the problem (or the challenge or the opportunity, or whatever) first, before leaping to specific solutions. Computer people, especially, tend to be much more comfortable dealing with answers and solutions than with questions, but it is important to go through the process of everyone agreeing on the question first. The next step is to agree on the criteria you will use in choosing among the various candidates for answers. After that, expect people to rise to the occasion, to look at what's best for the institution, and they probably will.*

Q. Our data situation is in total chaos. We have administrative data everywhere, from a few mainframe databases to a number of minicomputers to literally hundreds of micros all over campus. It is only recently that we began to take the notion of "institutional data" seriously, mostly because we just started doing institution-wide strategic planning and found we couldn't answer some key questions due to the dislocation of the data. I don't really have a question; I just wanted my colleagues to know how bad this can get when no one is paying attention.

A. *We agree. Thanks for the warning.*

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Providing Information Technology Services to Higher Education

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REPORT
The Education Technology Newsletter for Faculty and Administrators

Do Computers Help Students Learn?

by G. Phillip Cartright

Why are computers increasingly becoming important partners in the instructional process? One answer is that they give us enormous speed, power, and access to a wide range of information at a moment's notice. Another is that they permit (even require) faculty members and students to be *interactive* users, allowing us to modify, experiment with, or customize information. The information can take the form of visual imagery—a chart, a still image, or even full-motion video—or be synthesized sound or pre-recorded sound taken from historical records. Perhaps by the turn of the century those disciplines that have particular interests in the sensations of taste, touch, kinetics, and odor will have developed simulations and applications as well. Then and now, however, the operational words are *modifiable* and *interactive*—key ingredients to learning.

But do computers actually help students learn? We know from long experience that any evaluation of teaching is a difficult task. A technique or style effective for one instructor may be less pertinent to another. So it is in teaching using technology—it is not for everyone, but in the hands of many instructors it can be very useful and effective.

The early years of traditional computer-assisted instruction (CAI) were revealing along many dimensions, and a brief reprise is useful here. First, we learned that CAI as a stand-alone tool can be effective under certain circumstances. Second, the development of pre-planned, tutorial CAI was much more difficult than we had thought was the case when the movement hit its stride in the late 1960s and early '70s. Third, students often became frustrated with non-interactive linear or lockstep instruction over which they had very little control. Even so, some of

continued on page 6

"Successive generations of technology, in order to more than marginally change costs, require us to reengineer our business practices. This realization comes when we recognize that the new technology is not just a simple, cost-effective substitute for the old way of doing business but that it has contained within it the capacity to significantly alter our way of doing business —or even the business we are in."

Robert Heterick
"Too Smart Is Dumb"
EDUCOM Review
November/December 1993

NEWSBRIEFS

SATELLITE BROADCASTS FROM IAT

The Institute for Academic Technology (IAT) will be broadcasting over satellite during the winter and spring on topics exploring the use of multimedia, technology trends, design of instructional facilities, and distance learning technologies. The IAT, a non-profit partnership between IBM and the University of North Carolina, was created to support the use of computer technology in education.

"Classroom Design With Technology in Mind" will be broadcast on February 24. This program concentrates on the art of creating classrooms that match technological form with pedagogical function. Experts will demonstrate and discuss how various classroom configurations not only facilitate different kinds of classroom interaction, but also create new opportunities for teaching and learning. "Creating a Campus Network Infrastructure," to be broadcast on March 24, will cover physical and support issues involved in planning, installing, maintaining, and upgrading a campus network infrastructure. "Toward a National Learning Infrastructure," scheduled for April 21, has a panel of experts examining why educational innovations—in the form of technology—are difficult to sustain, fund, and transfer to other settings. The panel will discuss how new instructional models can lead to a systemic shift toward accessible and affordable learner-centered education.

For more information, contact the IAT at 2525 Meridian Parkway, Suite 400, Durham, North Carolina 27713; (919) 560-5031.

DATATEL SCHOLARS FOUNDATION BOARD MEMBERS NAMED

Datatel, Inc., a supplier of software and services to higher education, has named five additional client representatives to the Datatel Scholars Foundation Board of Directors. The Board oversees the awarding of scholarships to eligible students to attend a college or university selected from one of Datatel's client sites. The new members are Dr. Rose Marie Beston, **Nazareth College**; Dr. Robert H. Donaldson, **University of Tulsa**; Dr. Helen Stewart, **Rider College**; Sister Elizabeth Anne Sueltenfuss, **Our Lady of the Lake University**; and John A. Synodinos, **Lebanon Valley College**. They join current members, Joseph Conte, **Southwestern College**; Dr. Stephen Jonas, **Sinclair Community College**; Dr. Dennis Michaelis, **McLennan Community College**; and Dr. Prezell R. Robinson, **Saint Augustine's College**. For more information on the Foundation, contact Datatel at 4375 Fair Lakes Court, Fairfax, Virginia 22033; (703) 968-9000.

NATIONAL NET '94

The National Net '94 Conference will be held in Washington DC on April 6–8, 1994 and will cover topics such as "Inside Washington—Who Holds the Checkbook?"; "Education—At the Forefront?"; and "With an NII, Do We Need an NREN?" For more information, contact Elizabeth Barnhart at EDUCOM, 1112 16th St. NW, Suite 600, Washington, DC 20036; (202) 872-4200.

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Don't Toss the Baby with the Bath Water

by Stephen E. Maloney, Boise State University

Are you in charge of a data center with one those "dinosaur" mainframes? Are management and users asking why you are not migrating quickly to client/server systems? Do you have a nagging feeling in the back of your mind that you are not using microcomputers as much as you should be? You know that the availability of less expensive hardware and software with personal computer workstations and servers has to be given serious consideration. That dinosaur just keeps getting used more and more and budget is growing increasingly tight.

But you also know that open systems and client/server initiatives are costly in terms of time, training, and risk. You know you have more than enough to do just keeping the existing systems running efficiently and making only the most necessary changes. Staff availability allows new development on only two or three projects at a time, and the so-called legacy systems in your enterprise are the bread and butter systems for your institution. Your development and maintenance staff are familiar and comfortable with the tools they already have.

Can those less expensive platforms be used without the expense and risk you know are inherent in making such a major change?

Yes, there is a way to do client/server systems using familiar tools and familiar techniques. My organization, Data Processing and Information Systems at Boise State University, has recently completed a pilot project, scheduled for full implementation shortly, that has proven a means of developing client/server systems without retraining, with low risk, and using less expensive hardware and software environments.

We adapted a mainframe COBOL/CICS system called DARS (Degree Audit Reporting System) to run on a personal computer server. The degree audit application itself is now run on the server where the rules data describing graduation requirements for various majors and other relevant files are stored. Student data remains stored in a traditional mainframe student records system, supplying student information to the DARS system as required over the campus Ethernet network.

> *You don't have to throw away the training, the years of experience, and the knowledge of your programming staff to develop client/server systems. Use the tools you know and reap the benefits.*

The system will be accessed from personal computers on the campus network and by terminal users of the mainframe computer. All this was done using COBOL and CICS—familiar tools to the programming staff—"porting" the application from a mainframe application to run on the microcomputer server. The result is a client/server system without the costs and risks generally associated with client/server systems, but with many of the benefits—principally networked computing and less expensive hardware and software platforms.

This project has illustrated a means of taking a conservative approach to client/server computing. The rewards associated with client server/computing are achieved by offloading an important system from a mainframe to a less expensive platform. The risks are minimized by using familiar tools and techniques, and by relying on a legacy system to supply the data. In addition, the flexibility of being able to port the application back to the mainframe if required, and also to a variety of other platforms if needed in the future, is inherent in the resulting system. In fact, a system could be developed using all of these platforms in an elaborate cooperative computing solution if the problem and the computing environment made it necessary.

All in all, the project has proven successful and has shown that a viable alternative to more drastic methods to developing client/server computing is available to many traditional data processing organizations. You don't have to throw away the training, the years of experience, and the knowledge of your programming staff to develop such systems. You don't have to do extensive or immediate retraining in Unix, DCE, etc. While growth and acquiring new knowledge is happening in a natural and evolutionary way, you can use the tools you know and reap the benefits. ■

Steve Maloney is Associate Vice President for Data Processing and Information Systems at Boise State University.

Top Ten Reasons for Illegally Copying Software

(and why none of them are good enough)

by Vince Incardona, Rochester Institute of Technology

Okay, okay, we know you have heard it before: "Thou shalt not copy software illegally." So why are we reciting this litany again? Simple—it's because we occasionally encounter illegal software copies and we have a responsibility for reminding the university community that ownership of intellectual property such as software must be respected. Usually, when we confront people with the notion that maybe they shouldn't be doing this, they rationalize such copying with one or more of the following reasons. We feel compelled to point out why none of these "defenses" are likely to hold up if you are caught.

I'm allowed to make a backup in case something happens to it, so it must be okay to use it on another machine. Most software is sold with the stipulation that you can do this, but a backup copy is exactly that—a backup. Vendors recommend that the copy be used for installation. The original should be safely locked away. If you then do anything other than store the copy for safekeeping, it would be very reasonable to conclude that you made the copy simply to avoid paying for a second license.

I didn't copy it—a friend gave it to me. Technically, you're right. You would not be guilty of illegally copying software in this case, although your friend would. However, since illegally copied software is viewed as being stolen property, you would be considered just as culpable for receiving illegally copied software as you would be for stealing it in the first place.

My department head/instructor/boss told me to. It's her problem. The defense "I was just following orders" is a weak one. It does not work for soldiers who commit atrocities; it does not work for crooked politicians; it would not work if your boss ordered you to embezzle funds or commit other illegal acts;

> *In most cases, software engineers are not millionaires; they are working people like you who have staked their livelihoods on the programs you are stealing.*

and it will not work if your boss tells you to illegally copy software. Your boss would not be able to legitimately dismiss you for insubordination because you refused to commit a crime, but you could be fired for obeying an order to do so.

I bought the software, shouldn't I be able to do what I want with it? Software is seldom if ever sold to individuals. What is sold is a license to use the software. The terms of that license are almost always spelled out on the outside of the package, and they tell you what you may and may not do with that software. When you break open the package, the law assumes that you have agreed to abide by those terms.

It's not like I'm robbing somebody. Many people do not view software as property because it is not a tangible thing that you can pick up and hold. However, not all property is tangible. Software is intellectual property, just like a song, a book, an article, a trademark, or an invention. All of these things are owned, and can be purchased, sold, and licensed. All of them are used to make money for the people who create them. In the case of most commercial programs, the people who have worked to create them do this work for a living. In most cases, software engineers are not millionaires, they are working people just like you who have staked their livelihoods on the programs you are stealing. In a very real sense, you are taking bread from their table by making or using illegal copies.

It's OK if you're using it for educational purposes. If education were a justification for theft, driving instructors would be able to steal cars with impunity. While many software vendors are generous to educational institutions, this is their prerogative—not an intrinsic right granted to educators simply because they are educators. Furthermore, such generosity is firmly grounded in trust. Stealing intellectual property for educational purposes violates that trust and jeopardizes that generosity for all educators, innocent and guilty alike.

There is a doctrine known as "fair use" which allows some limited use of written materials in classrooms without permission from the copyright holders. Fair use generally applies only to sections of written works, and not the whole work. It generally does not apply to software that is copied in whole and distributed without compensation to the holder of the copyright. If this kind of distribution is allowed, the software license will clearly state it. Don't assume that it is allowed unless you have it in writing.

I needed it, but the price was unreasonably high. If I had to actually pay for it, there is no way I could ever afford it. Software prices are high for the same reason the price of houses is high: both require a lot of highly skilled labor to create. As a result, there are many in our society who need housing but cannot afford it, just as there are many who need software and cannot afford it. If a homeless person broke into your house and took up residence in your living room, you would want the police to evict that person and they would have to do it. You might feel sorry for the person, but not to the point of abdicating your property rights.

Similarly, if a software company wants to prosecute people who illegally steal their software, you can expect that they will press charges, and probably win, no matter how sorry they feel for you. Their survival may depend on it.

I didn't know it was illegal. Unauthorized duplication of software is a felony in many states. State and federal laws provide for civil and criminal penalties if you are convicted. Copyrighted software carries a copyright notice on the package, and displays a copyright notice when it begins execution. It would be difficult to convince a judge or jury that you had no idea that unauthorized copying was illegal unless you first convince them that you had never used the software and that you had no clue about the meaning of the word "copyright."

The mere fact that you read this far means that you can't honestly say that nobody told you that copying software without a license is illegal. And in most cases, all that has to be proven is that you should have known better, whether or not you actually did.

> *The defense "I was just following orders" is a weak one. It does not work for soldiers who commit atrocities; it does not work for crooked politicians.*

It is only illegal if you get caught. Okay, so what if you do get caught? What could you be facing? Fines, imprisonment, and civil penalties at both the federal and state level, for one thing. At the university level, disciplinary action may be taken up to and including suspension, in the case of students.

Software vendors have formed a group called the Software Publishers Association, and the SPA both offers rewards for whistle blowers and conducts covert investigations of software piracy at large organizations. Most of the people who have been caught by an SPA audit never thought that it would happen to them, either. The SPA is not to be taken lightly. Since their livelihoods depend on successfully prosecuting software piracy, these people know what and who to look for, they know how to build a case against them, they have lots of expensive lawyers to do it with, and they usually have the full cooperation of both law enforcement agencies and the organizations they are investigating. If they find out you've been stealing software, you generally don't stand a chance.

Oh, come on, everyone is doing it. This excuse has been used to justify everything from speeding to lynching. It is by far the number one reason given for illegally copying software. The logic supposedly is that society tacitly approves of the action, even though there are laws against it. Therefore, it is morally defensible, even if it's illegal.

Think about this for a second. Approach this argument as you would if your son or daughter used it to justify something you considered wrong. This is tantamount to an assertion that you have no will of your own, and that you define right and wrong simply in terms of what you see people around you doing. If you don't see yourself that way, why give everyone the impression that you do?

The bottom line

The bottom line is simply this: if you are copying software illegally, stop it. If you see others doing it, tell them to stop it. If they don't stop it, turn them in. The practice exposes you and/or your institution to liability, jeopardizes your chances of receiving a good, legitimate deal from vendors, and compromises your university's reputation in the business community. ■

Vince Incardona is an assistant professor and a software specialist in the Academic Computing and User Services department at the Rochester Institute of Technology.
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BEST COPY AVAILABLE

Do Computers Help Students Learn? ...

continued from page 1

the early computer-aided instruction was effective, and the lessons from it are worth remembering. We have paid attention to these findings, and the technology-aided instruction of today is taking on a decidedly different pedagogical flavor from these earlier efforts.

When questions about the effectiveness of computer-based education are raised, you are almost certain to hear someone exclaim that "there is very little research on the topic." *Au contraire.* There have been literally hundreds of research studies carried out in which computer-based instruction was compared with conventional instruction in a controlled research environment. The studies have been carried out with college students, with elementary and secondary students, with adults, and with military personnel. Most of the subject matter has been factual and applied material but an enormous variety of subject matter has been covered by the instruction. In fact, there have been so many such studies that special statistical procedures (meta-analyses) are used to summarize them.

In general, these summaries reveal that CAI is equal or superior to conventional instruction on the following variables: student achievement, covering both immediate and long-term retention; attitude toward both the subject matter and the instructor; and time to complete the task. The generalization is that CAI students realize higher achievement in significantly less time than the conventionally instructed students.

I've spent many years (1967 to the present) working in academic computing and trying to get a handle on how best to use the computer in the instructional process. My early work was in mainstream CAI—we tried to teach the computer to emulate the human tutor. All told, we developed and implemented full-length college courses taught entirely by computer software that were used by over 25,000 students in 25 states, Canada, and Mexico. By all measures, the software was quite successful.

> *In general, studies reveal that CAI is equal or superior to conventional instruction in the areas of student achievement, attitude toward the subject matter and the instructor, and time to complete the task.*

More instructive, though, is how the field's approach to technology-aided instruction has changed over the past three decades. I am now much less interested in the tutorial approach—even though the research does show that students can learn from drill and practice and the tutorial modes of CAI. More exciting for both students and faculty are the more contemporary approaches: discipline-specific tools and instructional templates. To those I would add the most exciting usage of all—simulations.

Simulations of sophisticated, complex physical, literary, or psychological phenomena allow students to experiment with the concepts of the subjects they are studying. Imagine the excitement of first-year chemistry students as they move rapidly from theory to experimentation in a safe, forgiving environment—an environment in which they can study the effects of combining a variety of chemicals under many different conditions in a very short time. Such simulations make the actual laboratory experiences more pertinent, more efficient, and more effective.

We have learned that students, especially adults (and I like to put college students in this category), need to have some ownership in their learning process. They need to have some control over their learning and to be able to make some of the decisions about what, when, and how to study. The older tutorial, drill, practice lockstep approaches did not permit students control of their own learning. The newer academic technologies do.

The first uses of the computer in the college classroom were demonstrations. Faculty dragged computers or terminals into their classes to show students how the computer was used to analyze data. A common usage today is for presentation purposes—for example, a sophisticated random-access slide or video viewer, perhaps linked to a generic tool such as a spreadsheet.

Gradually, though, creative faculty are developing interactive classroom applications for such purpos-

G. Phillip Cartright is professor and director of the Instructional Technology Laboratory at the University of California-Davis. *This article is excerpted from "Teaching with Dynamic Technologies" which first appeared in Change, November/December 1993. Reprinted with permission of the Helen Dwight Reid Educational Foundation. Published by Heldref Publications, 1319 18th St. NW, Washington DC 20036.* *Copyright 1993.*

es as simulating phenomena within their fields, demonstrating research techniques, teaching about computer-based tools within their disciplines, or connecting to databases and other computers.

Faculty are also requiring students to use the computer in their homework, to transmit assignments or notes by electronic mail, or to follow up a lecture by working on related software in computer laboratories or on their own computers. Many such software assignments can be accessed only through the campus computer network.

The trend in faculty interest in academic technology is best represented by multimedia computing—learner-controlled, often networked computers that support text, sound, and full-color motion, all integrated into the instructional process. Such academic experiences are more realistic, engaging, and effective if a variety of communication modes is used for expressing information and concepts. Visual and auditory modes are enhanced through multiple representations of text, graphics, color schemes, photographs, full-motion video, prerecorded or digitally synthesized speech and other sounds, and so on. All these the learner controls at her own pace, whenever and wherever she chooses.

From static to dynamic technology

Movies, slides, conventional video, broadcast television, etc., are often excellent presentation tools but they are essentially single-purpose display devices. The computer, especially one connected to an information network, is a dynamic multi-purpose device that can take on multiple roles as needed: displaying, searching, simulating, and modeling.

Stewart Brand stresses the dynamic nature of digital technology in his classic book, *The Media Lab* (New York: Viking Penguin, 1988): "With digitalization, all of the media become translatable into each other—computer bits migrate merrily—and they escape from their traditional means of transmission. A movie, phone call, letter, or magazine article may be sent digitally via phone line, coaxial cable, fiber optic cable, microwave, satellite, the broadcast air, or a physical storage medium such as tape or disk. If that's not revolution enough, with digitalization the content becomes totally plastic—any message, sound, or image may be edited from anything into anything else." ■

"The seminal difference between the technologies we use today and those we anticipate for tomorrow is the dynamism of the latter. Whereas the prevalent instructional technologies of today are static, those of tomorrow will have dynamic, interactive characteristics. Today's prominent technologies are passive media: books, slides, transparencies (foils), movies, videotape, and recorded sound. Tomorrow's academic technology will be interactive multimedia that will require the user—the researcher, learner, or student—to interact directly with the media in real time and modify them to achieve instructional or research goals."

G. Phillip Cartright
"Teaching with Dynamic Technologies"
Change
November/December 1993

In Future Issues

- *State-of-the-art versus state-of-the-practice*
- *Beyond the numbers: what the statistics tell us about computer use on campus*
- *Who defines the "value" words: service, quality, importance, etc.?*

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EDUTECH RESPONDS

Q. We are thinking of combining administrative and academic computing into one unit. Can you describe the principal advantages and disadvantages of making this move?

A. *First of all, it's important to know that there is no one single organizational model that fits all situations. The trend in higher education is to combine administrative and academic computing, principally because this is seen to be an efficient way of organizing, eliminating duplication of resources and capitalizing on economies of scale. Separate units are usually seen today in either one of two places: the institutions that have always had computing separate and have not gotten around to changing yet for a variety of reasons, and institutions which have deliberately chosen this model because emphasizing efficiency is sometimes at the expense of effectiveness, and that, in certain institutions, is unacceptable. (What has often occurred in these institutions is that a combined center has made one of the principal constituencies very unhappy, and the members of that constituency have agitated for, and received, their own computer center.) In general, the advantages of a combined IT organization are coordinated planning, economies of scale, and efficient use of resources. The disadvantage is that a combined organization is also a more centralized organization, potentially further away from its users and their concerns.*

Q. Assuming we do go ahead and combine these two areas, where, then, should the new area report? Does it make sense to report directly to the president?

A. *There are two advantages of reporting to the president. First, it effectively removes IT from the politics of the institution by not "belonging" to anyone. The second is that it elevates IT to a level of importance in the institution that many feel is absolutely necessary now in light of IT's potential for transforming the way educational institutions function, both academically and administratively. The main disadvantage is that it often requires creating a new position at this level in the institution's organization, simply not a possibility for some, given today's budgetary constraints, and in other cases, the perception by the faculty of an already top-heavy administration.*

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The Education Technology Newsletter for Faculty and Administrators

The One Right Answer For Higher Education

Readers of this publication who have become accustomed to our editorial philosophy will know that we never endorse any specific information technology offering, even those aimed toward higher education. We have always felt that our objectivity towards products and services was one of the qualities most valued by our readers. We have also always believed that the *issues* surrounding information technology in higher education are much more important than the products and the vendors themselves, and besides, information technology managers are generally inundated with product- and service-related information anyway, and certainly don't need yet another publication touting this one or that. Helping to define the problems, developing strategies to come up with the answers, and providing tools and processes that enhance those processes have been the basic components of our publication's mission.

In addition, we have always promoted the position that there is no One Right Answer in our business. Information technology answers need to be specific to the institutions they serve, always taking the institution's own criteria into account, as well as its mission, goals, and resources. One institution may buy its software; another may build. One college may find outsourcing useful; another may not. One university will have a Chief Information Officer; another will choose not to. All of these answers are right, if they take the right issues into account and if they have been arrived at using appropriate processes. We have always maintained that there is nothing universal in higher education information technology, nothing that is always right under all circumstances.

We are going to make a departure from that philosophy this time. While not going so far as to single out a specific vendor or product,

continued on page 3

"Simply allowing the students access [to knowledge] does not help them to impose the structure that is the basis for management and use of their knowledge. The role of 'mediator' will change, becoming in some ways easier but in many more, challenging, as new technologies are brought into play. But the paradigm of the teacher/student relationship and the structured syllabus is still vital, and to ignore it in the quest for a technological fix to the economic and other woes of education invites great peril."

John Russ
North Carolina State University
Letter to the Editor
Higher Education Product Companion
November/December 1993

NEWSBRIEFS

COMPUTERS IN LIBRARIES '94

North America's largest technology conference and exhibition for librarians and information managers will be held February 28–March 4 at the Hyatt Regency Crystal City in Arlington, Virginia. The ninth annual Computers in Libraries, sponsored by Meckler Publishing in cooperation with the Special Libraries Association, will feature sessions on the Internet, local area networks, government information, OCLC systems, document delivery, and campus-wide information systems. There will also be preconference and postconference workshops on topics such as adaptive technology , ethics in Cyberspace, and marketing library services.

For more information, contact Meckler, 11 Ferry Lane West, Westport, Connecticut 06880; (800) 632-5537.

INFORMATION TECHNOLOGY AND DISABILITIES

A new quarterly electronic journal, *Information Technology and Disabilities*, has just begun publishing over the Internet. It is intended to have articles by educators, librarians, human resources and rehabilitation professionals, as well as campus computing and other professionals concerned with the effective use of technology by people with all kinds of disabilities.

Feature articles in the premier issue offer a case study of an accessible CD-ROM workstation at the Seattle Library for the Blind; a profile of the St. John's University UNIBASE system, including the rehabilitation resources housed there; and the Royal Society for the Blind in Australia which has developed screen design principles for enhanced accessibility.

The first issue is available this month. To receive each issue automatically (75-150 pages), send a message to LISTSERV@SJUVM.STJOHNS.EDU with the following single line: SUBSCRIBE ITD-JNL Firstname Lastname. If you would like the table of contents only, send the following: SUBSCRIBE ITD-TOC Firstname Lastname; you can then access specific articles at the St. John's University gopher.

CALL FOR PAPERS FOR ASCUE CONFERENCE

The Association of Small Computer Users in Education (ASCUE) is seeking proposals for presentations at its 27th annual summer conference, to be held June 12–16 in Myrtle Beach, South Carolina. Presentations should focus on areas of administrative and academic computing that would be of special interest to small colleges, such as network applications and management, new teaching methodologies, hardware and software obsolescence, strategic planning, and staff development.

For more information, contact Mary V. Connolly, Program Chair - ASCUE, Mathematics/Computer Science Department, Saint Mary's College, Notre Dame, Indiana 46556; (219) 284-4497.

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The One Right Answer For Higher Education ...

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we are going to endorse an organization and the services provided by that organization that we feel have become so important in the last few years as to now be absolute requirements for all information technology managers in higher education. That organization is CAUSE.

Many of you know CAUSE, and indeed, many of you are already members. But far too many higher education IT managers are not. Something like two-thirds of the eligible institutions in the US who could join CAUSE have not. And even of the ones who are members, there are those who are not taking full advantage of CAUSE's services and offerings.

Now more than ever

Why CAUSE? Because it is the one single fully comprehensive, truly cost-effective resource that helps us be excellent in our work. And if ever there has been a time in our history in which higher education information technology managers needed to be excellent, it's now. It is imperative that we be and do our best.

Consider what the typical IT manager faces today: constant demands to serve more users; a pressing need to keep up with the changing technology (including displaying versatility in telecommunications, multimedia, alternative input methods, improved programming techniques, new database strategies, and daily changes in hardware price/performance ratios); an imperative to keep within increasingly severe budget constraints; and an ever greater need for accountability to the top administration.

This all adds up to just about the most stressful job of any on campus. More pressure, higher expectations, and a basic lack of understanding of technology issues by the campus decision-makers characterize most, if not all, higher education IT environments. We have to know what's right; we have to make excellent decisions; we have to know what to do and on whom to rely.

And now, with some new research conducted by Gary Pitkin of the University of Northern Colorado, not only is there more pressure on IT managers, but perhaps fewer rewards as well. Pitkin's research (soon to be published) suggests that CIOs in higher education may be declining in influence and importance. Why this is happening is not clear, but it's possible that it could be due to the CIOs themselves not living up to the totality of the job requirements: being political as well as technical, being an influencer as well as a doer, being a visionary as well as an implementer. If this is so, then it is even more critical that higher education IT managers transform themselves to fulfill this increasingly broad and rich set of expectations. Our colleges and universities deserve no less.

> ***Why CAUSE?***
> ***Because it is the one single fully comprehensive, truly cost-effective resource that helps us be excellent in our work. And it is imperative that we be excellent.***

Why CAUSE

CAUSE is a very inexpensive organization to join. A sliding scale of membership fees puts it within reach of even the smallest institution. So, in a sense, just having access to the CAUSE staff in Boulder, Colorado is worth the price of admission. But membership benefits go way, way beyond that, and they are both tangible and intangible.

Tangible benefits include the CAUSE publications: the quarterly *CAUSE/EFFECT* magazine, with articles both by and about your colleagues and the work they are doing; the CAUSE Professional Paper series, each one an in-depth but succinct discussion of a topic of interest to you (such as open access to information or the value of computing itself among different types of institutions); and the quarterly *Manage IT* newsletter with brief articles about what's going on in your field. CAUSE also belongs to the Higher Education Information Resources Alliance (HEIRA), which means you also get all of the HEIRA publications, such as "What Presidents Need to Know About the Integration of Information Technologies on Campus." Yes, you already have enough to read, but the CAUSE material is so targeted to what your information needs are that you can be absolutely certain that your time spent reading is time well spent. There's no fluff, no sales literature, no irrelevant issues; this is all about things we deal with every single day.

Another tangible benefit is having access to the electronic database maintained by CAUSE, filled with information about what other institutions are doing with information technology. The data is available to you in both individual and aggre-

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What the Survey

Every year, the folks at the James Irvine Foundation Center for Scholarly Technology at the University of Southern California tell us what's happening in desktop computing throughout higher education. In a formal survey distribution and analysis effort led by Casey Green, we learn each year who has what on their desks, how much we're spending, what our technology priorities are, and how much everyone is being affected by budget cuts. As useful as this quantitative information is, however, there is information in this material that goes beyond just the numbers. What do these numbers really tell us?

Moving closer to one-to-one

It is clear that higher education overall is moving closer and closer to the inevitable: a one-to-one ratio of people to machines. As we reported in this academic year's "Hot Issues" issue (September 1993), the question used to be, "How many devices should we put into this new lab space in the Humanities Building?" Now the question is, "How quickly can we get to the point where all of our students have computers and what's the best way to get there?"

And the one-to-one ratio is as true for administrators as it is for faculty and students. The most important thing here is that more and more colleges are using the one-to-one ratio as a planning assumption—it is no longer something to be calculated or figured out—it is just assumed, and then the institution figures out how to get there. The numbers bear out the fact that we are getting closer and closer.

Moving outward

It is also clear that technology is moving outward as it multiplies. We started with one computer in one location, we now have many computers and they are in many locations. From this single, central focus and location of control we now have many people in control, and the need to coordinate all this so it doesn't run completely amok is crucial. And just as important as the coordination is the support. Most IT directors have come to understand this very well—sometimes the hard way—but it is surprising to see how many college presidents and financial vice presidents still think that the only cost for a computer is the hardware and some software.

It is surprising to see how many college presidents and financial vice presidents still think that the only cost for a computer is the hardware and some software.

The movement outward of all of this technology has some very real implications. While it is very good that machines are appearing on desktops miles away from the computer center, unless there is coordination, at least some standards, and a lot of support, the numbers of machines won't translate into effectiveness.

Another issue in all of this is something we can easily observe: as we get closer to the one-to-one ratio and as the many get further away from a central location, the one isn't a "one" anymore. That is, two microcomputers in adjoining faculty offices with exactly the same hardware and software can actually be two entirely different computing environments. They may be so different, in fact, that you can go from one office to the other and not see any similarities—the screen colors, the wallpaper, the way the icons are arranged (if, indeed, there are icons), the programs that start up automatically when the machine is turned on, and whether you see flying toasters or swimming fish when the faculty are not at their desks.

This personalization of one's computing environment signals a very healthy trend toward comfort with the technology—toward non-technical people feeling that they have a hand in all this. And the more comfortable people are, the more productive they'll be. But it, too, has support (and therefore, cost) implications.

But what are people doing?

Perhaps what is as important as what the numbers really tell us is what they don't tell us. For one thing, they don't tell us what people are doing with the technology. But do we really need to know that? Perhaps we did once, but again, the questions seem to be changing.

We used to ask a faculty member to justify a desktop microcomputer: "Please write up a proposal and put it before the Academic Computing Committee, and if they deem it worthy, if they think your use is *good enough*, they might grant your proposal." Many places still do

Numbers Tell Us

this of course, or something like it. But more and more we are seeing this instead: "You are a faculty member here. Because of that, you get a desk, a chair, a telephone, some chalk, and a microcomputer. Have a nice day."

This doesn't mean that the institutions that do this—and there are more and more of them—are being cavalier about this. Not at all. But the message is evolving into something closer to this: Use this technology for anything you want. If all you want to do is word processing, fine. If the only thing you want the network for is e-mail, fine. It's perfectly okay, because those uses of technology are just as legitimate as the computer science faculty programming in C++ and the sociologists using *SPSS for Windows*, and besides, you'll be expanding your use before long, even if you don't know yet in what ways. Now of course, we're not going to be particularly thrilled if every time we walk into your office you're playing Solitaire, just as we would not think much of your using your phone to call the Psychic Hotline on a 900 telephone number. But that sort of thing notwithstanding, you, Dr. Faculty Member, no longer have to "justify" your use of technology.

What about impact?

Another thing the numbers do not tell us—and this is something we *do* need to know—is anything about impact, effectiveness, or quality.

The numbers are growing, to be sure, and most computer people, at least, see that as a good thing. But how good is it? Is it making a positive difference? Is a transformation occurring in any way besides the increased physical presence of computing devices? There is a strong probability that the answer is "yes," but to actually prove that, especially to those who may be skeptical, survey data need to be combined with other information that is more qualitative than quantitative.

We have become very good at counting certain things, and bringing a consistency in the definition of the numbers across institutions, which is good. But we have a long way to go to be able to actually show impact. Is higher education better able today to educate and prepare students than it was ten years ago, before all this technology proliferation? Probably yes, but we can't prove it yet. The numbers tell us something good is going on. But we are biased; as computer people, we want to believe we're doing the right thing. Others need to be convinced.

> *We have become very good at counting certain things consistently and accurately, which is good. But we have a long way to go to be able to actually show impact.*

There is one other thing we want to keep in mind about these numbers. We, as computer people, believe technology is good. We believe it has great potential for transforming higher education in the most positive ways. But it can't do that without proliferation and proximity, and what we're seeing from the numbers is *tremendous progress* being made in a very short period of time. It's easy to forget, especially when you've immersed in day-to-day problems, how far we've come in so little time.

In spite of budget problems, in spite of the continued widespread lack of understanding at the top levels of our institutions about what technology is all about, in spite of an ongoing lack of standards, the numbers are terrific! Over 90% of private universities have a campus-wide network backbone. 50% of the faculty at both public universities and private four-year colleges have microcomputers.

We can't lose sight of how far we've come. Even while complaining a lot about how far we could be now "if only" this or "if only" that, we have really done a great deal. Sometimes it takes something like Casey Green's survey to help us stand back from it all for a minute and see that.

The 1993 USC National Survey of Desktop Computing in Higher Education was supported by grants from 12 corporate sponsors. The survey data are based on the responses from 981 two- and four-year public and private colleges and universities across the United States. Participating campuses completed the survey during spring and summer, 1993. The survey is available for $30 from the James Irvine Foundation Center for Scholarly Technology; University of Southern California; 300 DML; Los Angeles, California 90089-0182; (213) 740-2327. ■

The One Right Answer For Higher Education ...

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gate form, and it's a great way to do some comparisons on items such as expenditures, staffing levels, training strategies, and so on with institutions similar to your own.

The other three tangibles have to do with acquiring information from your colleagues: the first is the exchange library, filled with Requests For Proposals, strategic plans, disaster recovery plans, data access guidelines, and on and on. The second is the summer institute to learn about how to do this job right. And, of course, there is the Annual Conference, perhaps the finest, most well run, most informative and fun conference of its kind. Every year more people attend; every year the sessions get better, and every year you get to know more people—people you can talk to or e-mail between conferences about your work.

The intangibles

It may be the intangible benefits, however, that really sets CAUSE apart from its organizational brethren. The reason the intangibles are so important is the framework within which CAUSE operates—CAUSE is the association for managing and using information technology *in higher education*. CAUSE recognizes—and deals with—the difference between higher education computing and other kinds of computing. Attending a CAUSE conference is not like going to a DECUS meeting or to an AS/400 users' group meeting. Computing is meaningless in and of itself; it is only meaningful in terms of the organizations and the people that it serves. It only makes sense to consider computing and technology within its own—your own—organizational context. CAUSE recognizes that in everything it does.

Perhaps the most important benefit of belonging to CAUSE is that it gives you an opportunity (perhaps the only opportunity you'll ever have) to talk with people who are dealing with exactly the same things you are dealing with. Think about it: the person you report to doesn't understand IT well enough to really provide what you need in terms of support and understanding. The other directors on campus are looking to you to provide service and solutions, not to use them to unburden yourself to. And your staff knows the technology, but they don't know the politics as well as you do, and besides, there is only so much you can confide about your own distress and difficulties to the people who report to you without undermining their confidence. So who do you have? Other IT directors, that's who.

> *Computing is meaningless in and of itself; it is only meaningful in terms of the organizations and the people that it serves. Our work must always be considered in the context of higher education.*

The importance of this simply can't be underestimated. The typical IT manager returns to his or her campus from the annual CAUSE conference with a sense of renewal—not just from having heard some new ideas or new approaches, but from having gained a sense of community, from having been reminded that each of us is not alone, or crazy, or the only one struggling. That's not just a psychological comfort; it's a real resource to be called on again and again throughout the year.

CAUSE also gives you a career path, if you want it; it can help you go from assistant director to director, from director to CIO, from CIO to who-knows-where? The whole organization is focused on the individual—on you—more than on the institution. Of course, your context in your institution is the framework around which CAUSE is built, but all of its publications, all of its educational resources, and all of its conference offerings are aimed at you, the IT manager in higher education. CAUSE provides a single, clear, and consistent message: you are important, the job you do is important, and you can be the most important change agent on your campus.

CAUSE also shows you how to cope with your daily challenges, both by imparting theory and by providing forums for sharing practical experiences. It is this blending of theory and practice, the opportunity to read and talk with both thinkers and practitioners that provides the most useful coping mechanisms.

To be even more responsive to its members, CAUSE is also planning some new activities this year. According to their strategic plan, a priority is being put on making all CAUSE publications available electronically; there will be new regional activities all around the U.S.; and there will be an addition to the CAUSE Institute, this one for director-level managers.

Join CAUSE. Go to the conferences. Read the publications. Sign up to be on one of the committees. CAUSE helps us be excellent. That's the bottom line. ■

The EDUTECH Report Predicts

Our predictions for 1994, bound to be an interesting year...

• An IT manager at a prominent university will decline to invest in a mainframe upgrade, declaring that "we have to start looking at some of this new-fangled stuff, like microcomputers."

• Despite rumors to the contrary, SCT will not buy out Datatel, CARS, or Quodata; the Internet will be brought to its knees for a full month with listserv traffic on the implications of this to current customers.

• The institutions that do not belong to EDUCOM will form a new national consortium. Called CPWDNWTSOTFTELATAC (Computer People Who Do Not Want To Sit On The Floor To Eat Lunch At The Annual Conference), the group will try to interest Steve Jobs and Ross Perot in funding its start-up.

• Two college presidents will put microcomputers on their desks. One of these two will actually use it.

• The 1994 CAUSE Conference will be marked by the discontinuance of its *ELITE* award. Instead, they will announce the new DTE medal (Down To Earth - the Award For The Rest of Us), "In recognition of all of the higher education IT managers who have wiped out their programming backlogs." No one will get the medal this year.

• Having successfully outsourced its bookstore, dining halls, maintenance operations, and information technology services, a college in northern Oregon will outsource its faculty.

• After spending $4.5 million to develop the admissions module of a student information system, a college in the midwest will write an article for *Change Magazine* with the opening sentence, "We knew right from the beginning that we would never be able to afford a packaged system, so we decided to do it all in-house."

• In early February, the network manager at a university in California will actually get an AS/400 onto the campus TCP/IP network. She will be sent to every IBM users' conference for the rest of the year to give a talk on "IBM's successful interoperability strategy."

• Two faculty members at a large research university in the south will team-teach a class using SPSS for Windows from a network server and everything will work the first time. Even though they will write a paper about their experience, no one will believe them. The *Chronicle of Higher Education* will run an article called, "The Cold Fusion of 1994."

• In recognition of the increasing numbers of potential applicants who want to know about the institution's computing facilities, a private liberal arts college will float a bond issue to raise money to open a campus computer lab. The president's best friend will equip the new lab with state-of-the-art Lisa computers. Enrollments will not improve.

• This will be overheard in at least one Staff Lounge: "I thought the water cooler in the Registrar's Office was the campus-wide information system." ■

"It's 1994. Welcome to the world of wireless, multimegabit, rightsized, group-enabled, GUI-based, object-oriented, user-empowered, decentralized, multimedia, massively parallel, totally open, mission-critical, almost-impossible-to-cost-justify computing."

"Forecast"
Computerworld Front Page
January 3, 1994

In Future Issues

- *Higher educations's Chief Information Officer: what's going on with this position?*
- *State-of-the-art versus state-of-the-practice*
- *Who defines the "value" words: service, quality, importance, etc.?*

Need a consultant? EDUTECH International provides consulting services exclusively to colleges and universities. Call us at (203) 242-3356.

EDUTECH RESPONDS

Instead of our usual question-and-answer feature for our back page, we want instead to take this opportunity to wish all of our readers a very happy new year.

We are approaching the conclusion of our ninth year of publication. January 1994 marks our 106th issue since we began publishing in April of 1985. A great deal has changed since we began in this rapidly accelerating world of information technology, but one thing that hasn't changed is the steadiness of our readership and our dedication to keeping our readers informed.

There is no better business to be in than higher education information technology. It is a unique combination of many different flavors, from academic to administrative, from the quiet and solitude of a college campus over holiday break to the hustle and bustle of the annual IT conferences; from the pomp and pageantry of commencement to the need to reload the production files in the middle of the night; from the pressure to downsize and reduce staff in the computer center to the thrill of completing the first registration period using touch-tone. Higher education information technology is a unique combination of challenges and opportunities, and we are very glad to be a part of it all.

We hear from our readers quite a lot about their opinions of various articles, about how they feel about our newsletter in general, and about their work. If you haven't called us or dropped us a line, we'd like to encourage you to do that. Our mailing address and telephone number are printed on the bottom of the second page. Our publisher, Linda Fleit, can be reached electronically on the Internet at LFLEIT@MCIMAIL.COM.

Thanks to you all. Thanks for making our newsletter a success. Thanks for your continued interest. May your computing in 1994 be fruitful and productive... and fun.

EDUTECH INTERNATIONAL
Providing Information Technology Services to Higher Education

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The Education Technology Newsletter for Faculty and Administrators

Focus on the Foundation: Decision Support Will Happen

Many higher education information technology professionals believe that the real payoff in an administrative information system comes when the top management of the institution begins to use it, especially for decision support purposes. Although it's important, the thinking goes, that the basic operations of the institution run well, when the president, the vice president, and the deans begin to really use the system themselves, the potential of all of that valuable information contributing to the decisions affecting the future of the institution can finally be realized.

This focus on the high-level use of information systems quite naturally leads to a situation in which the campus computer folks may be spending a great deal of time and energy on specifying, designing, and implementing "decision-support systems" for top administrators and deans. Unfortunately, this time and energy may be grossly misplaced, and even worse, may be completely wasted. Misspent resources are problematic at any time, of course, but in these times of tight budget constraints, no computer services department can afford this.

Rather, the focus should be, not on the top-level, but on the foundation of the information system; if the foundation is done well, decision support will take care of itself. What is the foundation? Three things: the data, the tools to get at the data, and the training needed to understand the data and how to use the tools. These three related components together form the basis of one of the most important payoffs of an institution's information system: to allow the top administration access to the information they need to do strategic planning and to make strategic decisions. In addition to using the operational components of the system to support the institution's reengineering efforts, this is why it

continued on page 6

"My main concern with teaching students about computers is giving them the ability to make informed decisions about what effect computer technology may have on their professional and recreational lifestyle. In my mind this is more important than transferring some basic skills in the operation of desktop productivity enhancers.... I believe that unless we comprehend something of the intrinsic nature of the computational metamedium, then we lose control and place ourselves in a position of subservience to that technology."

Paul Brown
Mississippi State University
"An Interdisciplinary Approach to Art and Design Education: Computational Design"
T.H.E. Journal
December 1993

NEWSBRIEFS

HANDS-ON INTERNET

A beginning guide to the Internet is now available for PC users, published by Prentice Hall. *Hands-On Internet*, by David Sachs and Henry Stair, is a series of eight on-line tutorial sessions that lead PC users through the Internet. Sachs is professor of office automation systems at Pace University and Stair is a senior consultant with Mycroft Information.

The authors show how to start, where to start, and how to explore the Internet. The book includes a disk with communications software; the user needs to supply a PC, a modem, and a service supplier (advice and information on modems and service suppliers are also included). The tutorials include sending electronic mail, participating in mailing lists and newsgroups, and accessing files on computers around the world.

The book is available for $29.95. For more information, contact Prentice Hall, Simon & Schuster Education Group, 113 Sylvan Avenue, Route 9W, Englewood Cliffs, NJ 07632; (515) 284-6751.

TECHNOLOGY IN LEARNING AND TEACHING

"Technology in Teaching and Learning," a hands-on workshop for faculty and others involved with instructional technology, will be held March 22–25, 1994 at Northwestern University in Evanston, Illinois. Sponsored by Northwestern's Academic Computing and Network Services department, the workshop will focus on incorporating the Macintosh computer into the higher education curriculum.

Workshop topics include dynamic lecture tools, introduction to HyperCard, digitizing and image manipulation, Internet resources, visual data archives, and hypertext.

For more information, contact the Technology in Learning and Teaching Program, ACNS - 2129 North Campus Drive, Northwestern University, Evanston, Illinois 60208; (708) 467-4456.

WARNINGS ABOUT BOGUS COMPANIES

Several people and organizations have issued warnings in the past few weeks about bogus companies on the Internet. For instance, one company offering to provide free Internet access accounts will not do so until it receives the potential customer's credit card number.

Potential customers of Internet services are encouraged to make sure that the service provider is a real company, and to be very suspicious of companies that claim to be large, non-profit providers of Internet services. Before giving such companies any personal or credit card information, do some research on them, including calling them to verify that they are actually in business.

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Computer Services Needs to Compete to Win

Conventional wisdom suggests that college and university computer services departments do not function in highly competitive environments, such as the ones we would typically find in the business world. The most common circumstance is that the department that provides information technology services to the campus thinks of itself as a sole supplier to a captive audience.

There are two things that are dangerous about this way of thinking. The first is that it leads to complacency and the second is that it is becoming less and less true each day. Computer services departments that continue to think of themselves as being in a non-competitive environment need to change their thinking on this very quickly, or else be at risk that they will end up as the losers in the competition.

The competition

Who is the computer center competing against? At an overall level, of course, there are the outsourcing companies and service bureaus. Interestingly, even though this option has been available to higher education for at least 25 years, institutions engaging outside companies to manage and administer the full range of the institution's computing services is still relatively rare, and can be considered an extreme case. Less extreme, however, is outsourcing portions of the computing center's tasks, such as networking services, microcomputer maintenance, or hardware operations.

A different approach is found in specific areas. For instance, while purchasing commercial software packages can be thought of as competing with the institution's own programmers, a more relevant concern are the programmers hired throughout the institution by departments other than the central computing services department. Here we are talking about actual hiring, not just distributing programmers throughout the user community, but having the users themselves post the positions, do the interviews and reference checking, and then hire into the positions, sometimes without any input from the computing department at all.

Is the institution getting its money's worth out of information technology? If not, or if the perception is that it is not, the decision makers at the institution may tend to increasingly turn to the computer center's competition.

One of the most troubling aspects of this, of course, is when the user departments hire students, and then central computing services has to pick up the work after the students depart. A user department may also hire contract programmers for either short- or long-term project assignments.

In all of these programming cases, the users are sending the computer services department a clear message: we can do what you do, but better, faster, cheaper, or even all three. That may be a difficult message to hear, but it is ignored only at the computer center's peril.

Of course, the center needs to be able to consider the needs of the whole institution, and to try to look at the situation objectively. There may be cases in which it really does make sense for others to provide the same services, for a variety of reasons. It may even make sense to do full outsourcing. But the computer services department ought not to find itself in this sort of situation accidently, or worse, unprepared. If it does make sense for others to provide some or all information technology services, then it would be a much better situation for the idea to come from the computing department itself, rather than for the idea to be foisted upon it.

The computer services department has the potential for providing enormous value to the institution. Often, it is the only department that can provide a full suite of services, an integrated cross-platform solution, a blend of packaged and custom software, and the "tailoring" of the computing environment that brings real benefit to the users. The computing department may very well be in a unique position to combine the technology (a broad array, including what's coming down the road) with the user's business (from the user's point of view). But the department has to recognize this role, not take it for granted, and live up to the expectations and responsibilities inherent in it.

Is the institution getting its money's worth out of information technology? If not, or if the perception is that it is not, the decision makers at the institution may tend to increasingly turn to the computer center's competition to make sure that it does. ■

An Approach to Promoting Ethical and Legal Computing Behavior

Many computer centers struggle with how to promote the right sort of computer usage and behavior on their campuses. For example, the computer center staff is often faced with how to handle a faculty member who is known to have a bootlegged version of software on his or her microcomputer. Or an administrator who makes a copy of an institution-supplied software package for a friend at another institution. The staff may too often find themselves in the unwanted role of policemen, or even worse, judge and jury.

No one knows for sure, but educated guesses speculate that US software companies may be losing as much as $2 billion a year because of software piracy. Frequent disruptions to computing and communications caused by viruses, worms, or other forms of mischievous behavior can result in huge amounts of wasted resources. And beyond just the basic legal issues, there are serious ethical issues involved in day-to-day campus computing behavior throughout the user community. Adding to the problem is that every day, more and more campuses are connecting with others in one way or another, so an individual institution's computing behavior problems are more likely to spread beyond its own boundaries, and could threaten the computing going on at many other colleges and universities.

Institutions of higher education are typically known for their freedom and openness. Indeed, information (at least of certain kinds) is *meant* to be shared and discussed. There is usually not the same sort of behavioral "rules" that one might find in a more structured business or manufacturing environment, and there is certainly a widespread reluctance to punish, or even embarrass, prominent (in the case of faculty) or tuition-paying (in the case of students) members of the academic community.

In this kind of an environment, is there an approach to promoting legal and ethical computing behavior without becoming dictatorial purveyors of Draconian measures, or even worse, the ones responsible for meting out the "punishments" for violations? The answer is that there indeed are, but to be fully successful, each approach needs to fit the culture in which it is employed. The three ingredients in the successful approach are expectations, information, and enforcement.

Expectations

The first thing that needs to happen has to do with expectations. The computer services department should expect that most members of the academic community, once informed and educated, will behave in an appropriate manner. The other part of that expectation, to keep it realistic, is that not everyone will behave so; those are the folks, very likely a small number of people, who will need the greatest amount of attention.

The other area of expectations is in the user community itself. They should expect that if they do not behave legally and ethically in their computing, there will be consequences, perhaps serious ones. They should also expect that everyone will be treated even-handedly, and that there is nothing personal in any of this.

Chances are, at least for students, expectations of general behavior are already spelled out somewhere, perhaps in the student handbook. This material can be integrated and built upon for computing behavior; it is already something the students are familiar with, and in this way, computing can be seen as a "normal" part of campus life, with expectations surrounding a student's behavior in this area, just as in all others.

Information

The second ingredient in a successful approach is to make it absolutely clear what legal and ethical computing behavior actually is. It needs to be spelled out, as explicitly as possible.

For instance, one area a lot of academic people have trouble with is copying software. There are still many who think it's okay to do, especially for "educational purposes." The institution needs to make it completely clear that it's not okay to do.

In other areas as well, such as the use of the institution's computing facilities and resources, including communications, printing, CPU time, and so on, for personal gain or for company profit; sending unwanted electronic mail with sexually explicit, otherwise offensive, or harassing language; posting libelous statements on public bulletin boards; and knowingly taking advantage of a bug or a hole in the system for personal gain, including just the satisfying of intellectual curiosity, all potentially constitute behavior your institution wants to prohibit, or at least, discourage. If so, it needs to be made explicitly clear that this is the case.

There is assistance available in this area of educating the community. In addition to the widely distributed "EDUCOM Code for Intellectual and Property Rights" (shown in the inset), EDUCOM also produces a brochure that many campuses have distributed to their user communities: the *Using Software Brochure: A Guide to the Ethical and Legal Use of Software for Members of the Academic Community*, Second Edition, revised January 1992. This brochure contains important information in plain English about the legal and ethical use of software. EDUCOM, in conjunction with ITAA Press, has published this brochure to provide guidelines to the academic community to help prevent software piracy. The brochure must be ordered in increments of 100; shipping and handling will be charged based on the size of the order. Prepayment is required. You can call (404) 442-9739 to find out what the shipping and handling charges are for your order, or if you have any questions. The cost is 25 cents per brochure for orders up to 1,200 and 22 cents per brochure for orders of 1,200 or greater. Contact the ITAA Press, 1650 Bluegrass Lakes Parkway, Alpharetta, GA 30102.

All of this material can be freely adapted to your own institution's particular circumstances.

The point of the education effort is to make sure that everyone in the community is clear about what is acceptable and unacceptable. This will make it much easier to provide the sort of computing environment we all really want: one without a lot of censorship or blocking devices (such as censoring certain newsgroups on the Internet or routinely searching the files of users on the system), but one which depends on people's own sense of responsibility and ability to make the right judgments about their own behavior.

Enforcement

The area of enforcement is certainly the trickiest one. Some campuses do what they can to set expectations and to educate and inform the community, and then let the rest happen as it will. Other campuses take more aggressive steps to make sure that behavioral rules and guidelines are being followed by everyone, and if not, that there are direct consequences for the rule-breakers.

Again, if there is already an existing device, such as a judicial review board for students, it can be adapted for use under these circumstances. For faculty and administrators (they can often be more of a problem than the students), some campuses have successfully used techniques such as withdrawing computing assistance and support by the computer services department until the person stops the undesirable behavior. Other campuses take harsher measures.

One thing very important is that the computer services department not be the judge or jury in these cases. It may certainly happen that the department will be called on to provide "evidence" of infractions, but actual judgements about who has violated the rules and what their punishment will be, if any, should not be the computer center's decision. It would not be the Registrar's decision, for instance, to determine the guilt or the punishment of a student who snuck into the office in the middle of the night to change a grade; it would be an institutional decision. It should be the same way for computing behavior. This is an institutional problem to deal with, not a problem for the computer center on its own.

Enforcement needs to have two characteristics to be effective: consistency and seriousness of purpose. The consistency aspect will ensure that everyone is treated objectively and fairly. Being serious about it will reinforce the message that the institution finds certain behavior unacceptable. ■

The EDUCOM Code for Software and Intellectual Rights

Respect for individual labor and creativity is vital to academic discourse and enterprise. This principle applies to works of all authors and publishers in all media. It encompasses respect for the right to acknowledgement, the right to privacy, and the right to determine the form, manner, and terms of publication and distribution.

Because electronic information is volatile and easily reproduced, respect for the work and personal expression of others is especially critical in computer environments. Violations of authorial integrity, including plagiarism, invasion of privacy, unauthorized access, and trade secret and copyright violations, may be grounds for sanctions against members of the academic community.

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Focus on the Foundation: Decision Support Will Happen ...

continued from page 1

makes sense for every institution to invest in the highest-quality information system it can afford.

The Data

The data kept in the information system must have three characteristics: it should be accurate, it should be timely, and it should be integrated.

What does this imply about the system itself? At a very basic level, it certainly means that the system should have as many error-checking mechanisms built into it as possible, preferably right at data entry time. For instance, a data entry person (or a batch process) should not be able to get an area code for home phone number into a record that has a home address zip code from another part of the country. A student's birth year should be within a reasonable range; there should be a finite number of salutation and name suffix possibilities. All of the basic data elements should have range and internal consistency checking done whenever and wherever possible. This applies, of course, to changes and updates to data as well as initial record creation.

In addition, the system should provide for once-and-only-once data entry, and preferably as close to the source of the data as possible. A particular data element may be available at different locations, and for different purposes, throughout the system, but it should only have to be entered into the system once. Not only does this mean that data elements need to be internally connected, it also means that there should be no duplicate records in the system. If, for instance, an individual is both an employee of the institution and an alumnus, there should be only one record for this person in the system, or at least, it should appear that way for processing (and data access) purposes. If this person changes his address, it should have to be changed in the system only once.

The other important aspect of data is its timeliness. Data which is updated automatically by batch processes at specific intervals, or data that depends on someone remembering (or being ready) to run a process at a specific time is inevitably less timely (and therefore, potentially less useful) than dynamically updated data. "Refreshing" a data file, for instance, a technique used by many institutions especially to provide end users with data for reporting purposes, should be avoided unless it is absolutely necessary for performance reasons. And the users that supply or depend on integrated data from other offices need to be educated and trained on what their part in the system flow is, to prevent timing difficulties.

> *It is very important to be able to imagine the use of the tools from the non-technical user's point of view; there should not be high barriers to learning and then to productively using the full tool set, even by intermittent users.*

The one other important aspect of data is some kind of a data element dictionary. Many commercial database management systems come with dictionary facilities, but even when such a tool is not readily available, a dictionary should be created. At a minimum, every data element used in or by the system should be identified, described, and explained. Data relationships should be described in the dictionary as well.

The Tools

The second major component of the foundation is the set of tools available to deal with the data. There should be a tool for all of the following (some tools do more than one function): selecting records from the database (by record, by selection criteria that the user determines, or randomly), selecting data elements from the selected records, sorting the records, downloading the selected data to a desktop computer, printing the data (either formatted or unformatted), displaying the data on screen, and feeding the data into other programs for further processing (mail merge or spreadsheets, for instance).

The most important aspect of the tool set, of course, is that it be entirely user-friendly and accessible to non-technical end users. After all, COBOL does all of the functions described above, but we would not expect end users to use COBOL to get at the data. Some of the supposedly friendly end-user tools available today are not much better, so a careful selection needs to be made. It is very important to be able to imagine the use of the tools from the non-technical user's point of view; there should not be high barriers to learning and then to productively using the full tool set, even by intermittent users.

Many end users will select their own tools, especially for use on microcomputers. Typically, however, there needs to be something

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residing where the data is (usually a mainframe) to do at least data selection and downloading. For users who do not have microcomputers, the full set of tools should work directly on the mainframe.

In addition, there should not be different tools for different data. We might find this situation, for instance, where there are different, non-integrated systems containing the institution's data. Even in these cases, the interface for accessing and manipulating the data should be the same across the entire system.

The Training

The key to success will be in the training, both in the tools and in the data. For top administrators, especially, this training needs to be administered very carefully and completely, and with a lot of sensitivity and flexibility. These folks typically don't have a lot of time, and they don't like to be treated like children. They need to have their training one-on-one (as much as possible), and it needs to fit into their schedules.

Understanding the data is just as important as understanding how to use the tools. Knowing how different data elements are defined and making sure that everyone is using data consistently to mean the same thing under all circumstances is a key challenge.

Decision Support

Once these three components of the foundation are put into place, then the need for "decision support systems" virtually disappears. The efforts at that point will go not into a pre-defined, fully specified system (which is practically impossible for a top administrator to do anyway), but in putting together a flexible, *ad hoc*, responsive information environment, where users are free to ask and answer their own questions whenever they need to. The questions will keep changing as the institution changes; the decision support process is, of necessity, iterative. It is also very personal and will differ from user to user.

Rather than trying to design a "system" to meet changing, idiosyncratic needs, it will be much more productive and effective to provide the right kind of environment and to let the users meet their own needs. With the data, the tools, and the training, our institutions will *really* begin to see signs of the enormous payoff in good information systems. ■

"When microcomputers became available 'for the rest of us,' circa 1979-80, a great clamor went up about computer literacy. I have done a lot of 'computer literacy' in the intervening 13 years, but no longer. I just asked all the students in a class to turn in their papers on a disk. No one said, 'Oh, I don't know how to do that.' These were quite ordinary undergraduates. I do not know how many can write a program; probably not very many. But I can tell them to use a computer, and none of them is surprised or put off by the assignment. Computers are a 'fact of life' for them in a way that was inconceivable to students a decade ago. Computer literacy has been achieved...."

"GRB"
Message on the Internet listserv AAHESGIT
Moderated by Steve Gilbert
American Association of Higher Education
December 29, 1993

In Future Issues

- *Higher educations's Chief Information Officer: what's going on with this position?*
- *Who defines the "value" words: service, quality, importance, etc.?*
- *Is there life after CIO-dom? Is there even a career path? Indications are yes...*

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EDUTECH RESPONDS

Q. We are about to go through a process to select a new administrative information system. Unfortunately, we are sort of stuck right at the beginning because we can't decide whether the new system should fit our needs as they exist, or whether we should expect to have to change the way we do things. In other words, do we adapt to the system, or does the system adapt to us?

A. *Actually, some of both. Today's systems tend to be very flexible and adaptable to an individual institution's needs, without a great amount of internal restructuring or reprogramming. Many of the systems are table-driven, or use similar techniques, so that an institution's methods for registering, or grading, or calculating GPAs, or writing to admissions prospects, or whatever, can be accommodated fairly easily. Generally, it is no longer the case that great, expensive amounts of programming needs to be done for each institution. It is, therefore, a reasonable expectation that most of your current ways of doing business can be handled by the new system. On the other hand, this could be a great opportunity to examine current operations and to make changes, even to think about reengineering the entire set of administrative processes. A new system can help you think about those processes in new ways, and many of the software companies are now providing reengineering services to help you do that.*

Q. We simply don't have enough money. I know everyone says that, but it's really true. Every time we need something additional in information technology, someone else at the institution loses. Isn't it always just a zero-sum game, as long as enrollments continue to decline and institutional expenses go up?

A. *Not necessarily, if there are ways to increase the whole pool. This isn't right for every institution, but some colleges and universities are charging a student fee, the proceeds of which are used to fund technology. This can also be built directly into tuition, rather than as a separate fee. Also, more institutions are raising revenues for IT in other ways: selling computing services and courses to outsiders, renting portable computers and cellular telephones internally, and reselling cable TV services to dorm students are all techniques in use today.*

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Campuses Need Not Wait to Enter Cyberspace

by John V. Lombardi, University of Florida

Many of us want to believe in cyberspace. We listen to visionary tales from technical gurus who dazzle us with promises of university electronic networks featuring seamless, interactive, real-time video. The leaders of businesses eager to control and profit from the electronic superhighway assure us that the new world of virtual communication lies just around the corner. They act as though the marriage of telephone, television, and computers will bring us into a brave new world within the next few years. Can these corporate visionaries deliver the goods?

A skeptic might ask: "Aren't these the same people who make us dial 34 numbers to place a credit-card call from a public phone? Aren't these the ones who can't deliver a cable signal to our television without a special box that defeats and duplicates the technology built into our televisions—in the process forcing us to juggle three remote controls? Aren't these the same folks who make computer networks so complicated and incompatible that the most important products running on them are trouble-shooting diagnostics?"

Despite the validity of those questions, I have to confess that I *am* a true believer. I know cyberspace will be with us someday; the knowledge is there, the basic physics problems have been solved. All that remains are the grubby details of implementation. So let's imagine that our huge conglomeration of cable, telephone, and entertainment companies manage to build a network that brings us 500 channels. What will we in education do with our portion of all that space? Will we build complicated, technically sophisticated products for it? Based on our past record, I don't think so, and I do not think that we need to, initially.

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"To meet the new goals and priorities of our time, we must focus on the analysis of information and the development of information literacy. We must go beyond the hardware of information storage and retrieval to develop 'thoughtware'—the critical thinking skills that will help our students ... develop the understanding necessary for lifelong learning. Together, we in education and our counterparts in information services have the critical task of connecting, integrating, and managing resources so that we are not in danger of being overwhelmed by information we do not know how to use."

E. Gordon Gee, President
The Ohio State University
"Time, Change, and the University"
Technos
Winter 1993

NEWSBRIEFS

TWENTY-FIFTH SNOWMASS

The Seminars on Academic Computing is celebrating its 25th anniversary this year. Higher education information technology professionals are invited to celebrate at the annual conference, August 5–10, 1994 in Snowmass Village, Colorado. The theme for this event, "New Technologies and Services: The Front Range of the Next 25 Years," will look at coming developments in the field. Four sessions are being offered: a University Executive Program, designed for senior officers of colleges and universities whose responsibilities and interests encompass high-technology computing and communications services; a New Directors' Seminar for those who have had the position two years or less; a Seasoned Directors' Update; and a Directors' Seminar.

For more information on the program, contact Jacqueline Brown at (609) 258-6034. For more information on the Seminars on Academic Computing, contact Debbie Byrd at (503) 737-2052.

TECHNOLOGY FOR THE ARTS AND HUMANITIES

Leaders of several humanities groups took the next steps to gain a voice for the humanities and arts in the development of the National Information Infrastructure. At their most recent meeting in January, the ad hoc steering committee of the National Initiative on Humanities and Arts Computing agreed to convene two working groups of nationally recognized experts in scholarly, instructional, and creative computing in order to present innovative technology in the humanities and arts.

The Working Group on Technical Requirements will define the particular challenges that the humanities and arts pose for technology. The Working Group on Electronic Resources will survey the range and variety of computer-based information and tools available and in development for transmission on the electronic superhighways. The findings of these working groups will be presented in June to a national meeting of major organizations and institutions involved in humanities and arts computing in America.

For more information, contact Dr. Charles Henry, Director of Libraries, Vassar College, Poughkeepsie, New York 12601; (chhenry@vassar.edu) or Dr. Susan Siegfried, Getty Art History Information Program, 401 Wilshire Boulevard, Suite 1100, Santa Monica, California 90401 (ssiegfried@getty.edu).

INTERNIC SEMINARS

The InterNIC, established by the National Science foundation to make Internet resources more easily accessible to researchers, educators, and the general public, is holding seminars this winter and spring on topics having to do with Internet access. These include using network tools effectively, building an electronic network information center, and tools for the classroom.

For more information, contact InterNIC Information Services, General Atomics, P.O. Box 85608, San Diego, California 92186; (800) 444-4345.

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The TMOTF Project: Teaching Materials of the Future

by Steve Gilbert, American Association for Higher Education

For the past 25 years I have been enthusiastically telling anyone who would listen about the revolutionary impact of information technology on education, and that "the next 6 to 18 months will be critical." Now I believe that the next 6 to 18 years will be critical.

Microcomputers, CD-ROMs, the Internet, authoring tools, multimedia, hypermedia, and virtual reality are only the beginning. Throughout the next 10-20 years, new applications of information technologies will offer ever greater potential for improving teaching and learning. We cannot yet predict when this onslaught of opportunity will slow down. Learning to ride these waves—instead of being swamped by them—is one of the most important challenges facing educational institutions today.

Books have both supported and structured much of the teaching and learning in past decades. As some of the new information technologies are added to form new combinations of instructional materials—e.g., textbooks, articles, computer software, Internet access, videocassettes—the processes of teaching and learning will be changed. Conversely, efforts at curricular and pedagogical reform will fail if the basic tools of instruction—the books and the ways in which they are used—remain unchanged.

But "business as usual" is already finished. The patterns of faculty and student use of textbooks and other information resources have already begun to change, irreversibly. One indicator of a changing pattern is the growing number of students who do not purchase textbooks in courses where the faculty member has adopted one. Other indicators include the growing number of faculty members who develop and use "course packs," and the increase in requests for the use of video media in conjunction with course assignments on many campuses. New means are needed for publishing, delivering, and helping faculty and students use new combinations of print and electronic materials successfully and cost-effectively. The long-term goal for all this change should be better learning at "reasonable" prices.

Many academic leaders, college store managers, publishers, information technology experts, librarians, and representatives of academic associations and professional disciplinary societies see both problems and opportunities as new digital media compete for their attention and use. Many are more confused now than in the 1980s about which technologies and which media hold the greatest promise for education, and which will gain the commitment of the others. This is the right time to build more effective bridges among these groups. Each can learn from the others through joint efforts to understand better the changing patterns of faculty and student use of instructional materials. More communication, coordination, and collaboration is essential for increasing the value of learning and teaching offered by higher education.

Project Overview

The primary goal of the Teaching Materials of the Future project is to help understand, shape, and smooth the transition to new systems for developing, publishing, distributing, and using materials, both print and electronic, that will support better teaching and learning in higher education. The primary strategy of the project has three parts. The first is obtaining, organizing, interpreting, and disseminating information about recent changes in the patterns of faculty and student use of instructional materials. Second, an effort will be made to identify feasible and preferable directions for the future. Third will be the development of "tool kits" to support and speed the desired transitions.

Information will be obtained primarily through interviews, guided group discussions, and Internet dialogues with academic leaders, college store managers, information technology experts, and publishers. Using information and insights generated by this project, faculty and students, college stores, publishers, and other information industries may be able to adapt more successfully to the continuing arrival of new information technologies, understand each other's goals and capabilities better, and achieve more productive alliances.

With initial support from the American Association for Higher Education (AAHE) and the National Association of College Stores (NACS), the "seed" phase, going on now, is focused on collecting information, detecting promising patterns, finding additional co-sponsors and funders, and sharpening the overall project plan. Special attention will be paid to differences among academic disciplines, differences between introductory and upper division courses, differences in approaches to teaching, and differences in student needs. The possibility of a small spring or summer conference is being evaluated. ■

For more information, contact Steve Gilbert at AAHE, One Dupont Cir., Suite 360, Washington, DC 20036; (202) 293-6440.

Campuses Need Not Wait to Enter Cyberspace ...

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I think that universities have a great opportunity to fill some of the huge new "bandwidth," but that we should not wait to develop snazzy educational technology to accompany every course. Universities have plenty of existing courses that could, with modest cost, be transmitted electronically in the very near future.

I remember how some of us got up each morning at the crack of dawn in the late 1950s to watch a television show that taught physics before we went off to high school. The teacher lectured from a podium and wrote formulas, graphs, and other material on the blackboard. He was very good, and we learned a lot, even in black and white. Recently, I tuned in to a televised course at the University of Florida and saw the professor standing at a podium lecturing and writing formulas, graphs, and other material on the blackboard. She was very good, in living color, and our studies show that her students learn a lot. But I didn't see snazzy audiovisual effects. And in my endless channel surfing, I generally don't find educational programs with the production values of a miniseries or a wildlife documentary. The money has simply not been available to develop such sophisticated and expensive educational products.

Today we have only a limited number of channels, so the space is dominated by companies with the resources to develop or buy up programs that will attract the widest audiences. In the future, though, when cyberspace is like the American frontier in the last half of the 19th century—wide open and virtually free for the taking—we will have a great deal of room for low-cost programming directed at small audiences.

University education, whether the generic undergraduate curriculum or the most specialized advanced training in scientific analysis, requires little technical sophistication to deliver. The value of the education is not in the gimmickry that surrounds it, but in the content that informs it.

Although university education does require highly trained faculty members, along with laboratories, libraries, and books, it does not necessarily require high-tech methods to deliver its principal messages.

Education teaches us the process of learning by showing us what to do with information. It shows us how to choose which information is important for what purpose. Although university education requires highly trained faculty members, along with laboratories, libraries, and books, it does not necessarily require high-tech methods to deliver its principal messages.

As the number of television channels grows by the hundreds, if we in universities are smart—and if we can get our corporate partners to come down from the clouds of superhype—we have ready-made in many colleges and universities an extraordinary quantity of educational programs that could be put into the bandwidth at very little cost.

Today, many universities either broadcast special courses in engineering or medical technology or agriculture or ship them via video cassettes. But these efforts deliver only a fraction of the academic and intellectual capability of our universities and only in selected fields with anticipated high demand. We don't offer much in poetry or comparative literature or teacher education, although we easily could—for the cost of a modest camera and audio pickup.

For an additional modest investment, each of us could adapt those curricula to take advantage of various forms of two-way audio-video technology. Such courses would not be high tech; they would not simulate the structure of an atom on the sun. They would simply be classrooms projected in their rough reality into the cyberspace. We could deliver the entire curriculum of a small college for what it costs to produce a couple of episodes of *Deep Space 9*.

Because the cost of electronically transmitting education is so low and because the potential bandwidth will be so large and so sparsely occupied at the beginning, we would not need huge audiences to make our new courses work. Fifty people watching on television, in addition to the 50 in the classroom, would be fine.

The technology exists through electronic mail on the Internet to support intense interactions among

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John Lombardi is president of the University of Florida. This article appeared originally as a "Point of View" in The Chronicle of Higher Education.

students and teachers about the academic substance of any course that is broadcast. Indeed, on many campuses today, faculty members already interact with their students as much via electronic mail as they do through regular contacts during office hours.

How should we begin? Someone with money has to believe in the potential positive uses of the network. The telephone, cable, and other communications companies now fighting over control of the superhighway ought to invest a tiny fraction of the huge sums they are going to spend on acquisitions, takeover fees, and hardware purchases to help us translate the academic substance of the university into cyberspace. The investment must be continuing, so that as the space expands and becomes more sophisticated, the delivery of our academic substance can be improved and enhanced. But we should start now with what we have.

Communications executives should not ask institutions for huge proposals with elaborate rationale and reinvented curricula. Instead, they should simply say something like: "Make me an offer to put your business-school curriculum on the air."

An institution could run that curriculum for three years and evaluate the results. If it was not working, by then, the university would probably have the know-how to present a more sophisticated product.

Unless we have something to put into cyberspace that has substance, all the technology in the world won't produce much of value. Our business leaders fighting over control of cyberspace do not appear to have thought much beyond the struggle to buy up every old television show and every movie inventory. Although some of them will think the product—education and knowledge—boring in its collegiate form, and certainly less exciting than the violence and action of commercial television, the public's thirst for higher education remains high.

The economics of the high-cost, but low-value, entertainment that dominates current television offerings depends on just a few channels and concentrated audiences. The economics of cyberspace requires the addition of low-cost, high-value programs to fill the huge bandwidth with material that can attract smaller audiences with specific needs. Institutions of higher education can deliver low-cost, high-value material better than almost any other industry.

Although some will think the product—education and knowledge—boring in its collegiate form, and certainly less exciting than the violence and action of commercial television, the public's thirst for higher education remains high.

Wider access to electronic media would also allow universities to better address some of the educational problems that plague our country. We know that some public schools have environments hostile to education and that many students do not have access to excellent teachers. We know that we don't have enough room in quality colleges and universities for all applicants and that many colleges and universities have entrance standards or tuition prices that are too high for some capable students. The availability of electronic education at all levels surely would open up access, reduce the economic barriers to learning, and encourage universities and schools to find ways to speak to larger, more extended audiences.

With technology, we can speak just as easily to low-income students of any age as we now can speak to the largely middle-class, 18- to 24-year-olds who attend our campuses. Commuter universities know how to communicate with a broader range of students than do many residential research universities, but even they must contend with the limitations of space and time. Cyberspace doesn't require new parking lots and doesn't limit students to large groups who collect in specific rooms at set hours.

In cyberspace, no one knows whether you are well dressed, young or old, male or female, black or white, urban or rural. We lose some of the context of normal classroom interaction without those clues, but we also remove the barriers to education that race, class, and location create.

So let's put education on screen and on net, not in a radically reconstructed and reinvented way, but simply as a projection of the already effective methods that we now have. Let's do it quickly, and then, when cyberspace and virtual reality become universally available, we can let go of our current practices and truly float free in the brave new cyberworld. ■

Student Ownership of Computers

by Harry Reif, James Madison University

One of the challenges that many institutions face as they plan to increase their involvement in the so-called Information Age is how to provide resources to allow access for students, faculty, and staff. The solution involves an ongoing institutional commitment to equipment, networks, training, and support. It is exacerbated by the fact that the useful life of most computer equipment is very short, often less than three years (in contrast to many other types of institutional expenses that have useful lives of at least five years). This financial commitment is more than many schools can afford, so often the issue becomes how to motivate students to purchase their own computers. While some might argue that the cost is too high for students to bear, they need only think about the fact that the cost of a computer today is comparable to a semester's tuition, much like the cost of a calculator used to be.

While there are no perfect answers to this question, some words of advice do apply. The first requirement for a successful solution is faculty involvement. Begin by assembling a core group of faculty composed of those who are either already using computers in their courses, have a strong commitment to use computers in their courses, teach courses where the computer is an object of instruction (e.g., computer science or information systems), or have expressed a strong interest in this process.

This group should be provided with an inventory of existing laboratory configurations, faculty PC ownership information and, if available, information on existing student PC ownership. This data should be viewed as the basis of what exists, not necessarily as a road map for the future; existing configurations will have to be accommodated by any new strategy but should not dictate that new strategy.

Once the organizational and data gathering tasks are taken care of, the first issue that needs to be addressed is what kind(s) of systems and software you want your students to have. While this is a difficult decision to wrestle with, it is important since you will have to address it again at least once a year as technologies and programs of instruction change. The more expertise you gain in resolving this issue early on, the higher the payoff for your institution. Using the faculty group in accomplishing this process is essential. Faculty can serve as the glue to bring separate departmental or college preferences for hardware and/or software toward a consensus. The outcome of this process should be one or more "model" configurations with options for enhancement. These model configurations should be ones that the school is prepared to provide operational support for.

The next step is to decide on how to distribute these systems to students and have students pay for them. Some schools build the cost into tuition and fees, while others have the students acquire the systems separately. I personally favor the latter approach because it is simpler to administer, but both are viable.

Once the systems are paid for, distribution can be accomplished via the bookstore or by working with local vendors. Systems should be configured and delivered to students with "core" software such as the operating system, a word processor, and a data communications package already installed. Any additional hardware such as a printer or mouse should also be installed. Each system should be fully tested before it is turned over to the student. Delivery to the student's living location should include a final test of all components in the presence of the student.

Maintenance also deserves special attention. Many students do not have the means to conveniently return machines for maintenance. A well-thought-out plan will include provision for maintenance that includes pick-up and delivery and the availability of an ongoing maintenance contract. The maintenance contract should allow for changes in ownership as students may upgrade their machines during their tenure. The contract should also, if possible, provide for service at locations away from campus during the summer months when students are off campus.

Coupled with the effort to put computers into students' hands, schools must be sure to address institutional support issues so that the machines can take on value for their students. This includes having tutorial sessions (perhaps noncredit) for students who need to learn how to use their new computers and tools. These sessions ought to include instruction on the ethical use of software and networks if this information is not already contained in another required course. Institutional support also includes making certain that instructors have access to computer systems so that their assignments and course materials are current with the

Harry Reif is Assistant Vice President for Information Technology at James Madison University.

technologies that their students are using. Training for instructors in the use of the systems and tools is paramount. Without tools and training for instructors, students will either have no use for their machines or will learn more about them than the faculty, thereby reducing the chances that the faculty will utilize computers at all.

A Help Desk available many hours during the day, evening, and on weekends is essential to assist students and faculty. The desk can be staffed with students who receive special training. It must have all supported hardware and software available along with documentation to assist customers. Walk-up, telephone, and on-line access to the Help Desk should be available. Finally, an investment to accommodate students and faculty who will want to access the computerized library catalog and other on- or off-campus computer systems is needed. This access may consist of combinations of dial-up and hard-wired connections located in residence hall rooms, the library, and selected locations on campus. At least one 24-hour facility should be available containing quality peripherals such as laser printers, color printers, plotters, and digitizers for students to use. While advances in technology have resulted in reductions in cost that make it reasonable to expect students to provide their own computers, similar economies have not occurred for peripheral devices; it makes sense, therefore, to provide these centrally, recovering costs for supplies if necessary.

All of the advice above can be summarized by saying that you need both a comprehensive plan that shows forethought and an institutional commitment that recognizes the importance of computers as tools that assist in the learning process. The plan provides the vision for how your institution will employ computer technology to assist in the pursuit and acquisition of knowledge.

Do not look for the plan to result in lower support costs for computing; it won't. It will, however, allow the institution to focus its limited resources on the equipment needed to support faculty, on the peripherals to complement the student-owned machines, and on the infrastructure to allow access to the multitude of campus and worldwide resources that will broaden the educational perspectives of your students. The plan will introduce student-owned computers onto your campus in a way that can greatly improve the learning experiences that you are providing to your students. ■

"The fabric of whole societies is being rewoven around the globe. Every major social structure now is subject to reappraisal, redesign, and replacement. Inevitably, the challenges of the dawning knowledge age will demand that the most conservative social glue, education, be reinvented as well. The same technology that is driving the overflow of arthritic bureaucracies holds the key to achieving this social reformation swiftly and productively. American global leadership can be established in the most profound technological and economic reconstruction since the industrial revolution. But radical action is needed—now."

Lewis J. Perelman
Discovery Institute
"Hyperlearning and the New Economy"
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EDUTECH RESPONDS

Q. As the financial VP of my institution, I am concerned about the recently formed information technology policy committee. The last thing we need here is for yet another group to develop a laundry list of computer projects that the institution can't afford.

A. *The financing of technology projects should be the concern of everyone, not just the financial VP. It is the role of an IT policy committee to help determine the place of technology at the institution by answering basic questions, such as: Is technology important to this institution? If technology has a role to play here, how small or large should that role be? How does the institution need to position itself with respect to technology, relative to its peer institutions? What major projects is the institution thinking about for itself that have an impact on, or could be impacted by, technology? These are major issues, which need to be explored and worked out by that committee. Once the answers are in hand, then the next task is to figure out what the potential financial implications are. Do the answers about "importance" indicate that the institution should be spending less, more, or the same amount as it has been spending on technology? If the institution is already spending the right amount on technology, then it just becomes a matter of allocating that amount wisely. But if the institution should be spending more than it has been, then the committee needs to figure out where that money can come from, whether from reallocations or from increased income. The point is that you should not feel that it is your role alone to be responsible about budget matters as they concern IT. It is the role of that whole committee to be responsible, and to deliberate wisely on the institution's spending on technology.*

Q. We're setting up a new Administrative Computing Advisory Committee. Do you have suggestions on what positions or departments should be on it?

A. *No, because it should be less a case of the positions or the departments that are on it than the individuals who will achieve the committee's objectives. You need people with a broad institutional outlook, a good appreciation for the value and potential of technology, and good communications skills. Since these characteristics do not fall evenly among departments or positions, our advice is to choose the people.*

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